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## Studies on the Chironomid Midges of Tsushima and Iki Islands, Western Japan. Part 2. Species of Orthocladiinae and Tanypodinae Collected on Tsushima.

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**Abstract:** Collection of the adult specimens of the insects family Chironomidae were carried out by Suzuki during the period from March 24 to 26, using light traps at 2 localities and by daytime sweeping with insect net at 18 localities on Tsushima Island. By microscopic examinations of 377 individually mounted slide specimens, 127 were found to be belonging to the subfamily Chironominae, and were classified into 48 species including 34 new species, and were described in our previous report (Sasa and Suzuki, 1999). The rest 250 specimens were classified into 56 species (including 31 new species) of the subfamily Orthocladiinae, and 6 species (including 2 new species) of the subfamily Tanypodinae. It was again demonstrated that this island is very rich in the chironomid fauna, and many new species are again added by the present studies. It is also shown that rather rare species so far collected only in central or eastern Japan are found in this remote island located in western Japan near the Asian continent.

**Key words:** Chironomidae, Orthocladiinae, Tanypodinae, New species, Medical entomology, Tsushima

### INTRODUCTION

Collections of adult chironomid midges were carried out by Suzuki during 3 days period from March 24 to 26, 1998 at 18 localities on Tsushima Island located between the Korean Peninsula and Kyushu, western Japan, by nighttime collections with light traps, and by sweeping with insect net at the side of rivers and streams. The specimens collected were preserved in 70% alcohol, and a part of them selected under a stereomicroscope were mounted individually in gum chloral medium, and examined under compound microscope. Out of a total of 377 male specimens thus studied, 127 were diagnosed as belonging to the subfamily Chironominae, and the results of taxonomic studies with these materials were described in the previous report of Sasa and Suzuki (1999). They were classified into 48 species, including 34 new species and one species new to Japan. The present paper deals

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with the classification and descriptions of the rest chironomid species belonging to the sub-families Orthocladiinae and Tanypodinae.

## MATERIALS AND METHODS

The chironomids collected were picked up with forceps, and were preserved in 70% ethanol solution. They were examined in the laboratory in Nagasaki University under a stereomicroscope, and those which were considered necessary for detailed species identification were individually mounted on slides in gum chloral solution by the method originally described by Sasa and Kikuchi (1995), and improved by Suzuki (in press), and were sent to Sasa's laboratory for detailed species identification and for morphological and taxonomic studies. The terminology used followed also that of Sasa and Kikuchi (1995). Olympus microscopic drawing apparatus was used for making figures. For species diagnosis of individual specimens, keys for identification of Japanese Chironomidae prepared by Sasa and Kikuchi (1995) and by Sasa (1998) were mainly used, and for comparison with Holarctic or cosmopolitan species the monograph of keys and diagnoses of adult male chironomids edited by Wiedelholm (1989) is used as the first step. The key to adult males of British Chironomidae published by Pinder (1978) is especially useful for comparing with the British species.

## TAXONOMIC AND MORPHOLOGICAL NOTES ON SPECIES COLLECTED SUBFAMILY ORTHOCLADIINAE

### 1. *Brillia japonica* Tokunaga, 1939

Eleven males were collected. No. 353:14 (#1:6), 353: (#1:6:2), 354:12 (#6:2), 354:64 (#8:1), 354:91, 93 (#11:1,3), 355:86 (#17:2), 372:06-09 (#1:6:2-5). This is one of the 3 species of genus *Brillia* Kieffer recorded from Japan, and is characterized by that gonostylus is forked into two arms and the inner arm is about 2/3 as long as the outer arm. AR is the present specimens are 0.73-0.92, or 0.87 in average of 11.

### 2. *Pseudobrillia komorii* Niitsuma, 1991 (Figs. 1 a-i)

Four males were collected. No. 353:15-17 (#1:11-13), 353:85 (#1:11:2). BL 4.44-5.26 (4.81 in average of 4)mm, WL 2.62-2.96 (2.76)mm, WW/WL 0.27-0.29 (0.28). Scutal stripes and postnotum dark brown, ground color of scutum and scutellum pale, abdominal tergites and legs brown. Head in Fig. 1 a. Eyes bare, both with a long and parallel-sided dorsomedial projection, ER 0.28-0.30 (0.29). Antenna with 13 flagellar segments, with a long terminal seta, AR 1.12-1.33 (1.24), AHR 0.53-0.56 (0.54). P/H 1.26-1.54 (1.40). SO 28-37 (31.1), distributed in multiple rows. CL 16-24 (20.0). Anteprepronotum (Fig. 1 b) separated in the middle, bearing setae all along its length, PN 16-29 (23.9). Distribution of setae on scutum and scutellum in Fig. 1 c. DM all 0, DL 48-81 (64.5) in multiple rows, PA 24-29 (26.3), SC 43-51 (46.0).

Wing (Fig. 1 d) entirely clothed with macrotrichia. Squama with 20-30 (24.1) fringe hairs, R2+3 in contact with R1, VR 1.27-1.33 (1.31), R/Cu 1.14-1.18 (1.16). Cu2 nearly

straight. Tip of front tibia (Fig. 1 e) with one spur, tip of middle tibia (Fig. 1 f) with two spurs, tip of hind tibia (Fig. 1 g) with only one spur, and a comb composed of 8 free spines. fLR 0.93-0.96 (0.94, unusually high), mLR 0.55-0.57 (0.56), hLR 0.56-0.58 (0.57), fTR 0.12-0.15 (0.13), fBR 2.9-4.0 (3.3), mBR 3.2-5.1 (3.9), hBR 3.4-4.4 (4.0). Pulvilli very small, brush-like (Fig. 1 h, front tarsus I).

Abdominal tergites and sternites with large numbers of long setae. Hypopygium in Fig. 1 i. Anal point absent. Gonocoxite with a long curved process bearing 2 or 3 short setae. Gonostylus also very long and curved, with 2 short setae near the base but without megaseta and preterminal setae.

**Remarks.** This species was recorded from Tochigi as a monotypic member of a new genus, and this is the second record. It is a genus of the *Brillia* complex of Orthoclaadiinae, and is especially characteristic in that gonostylus is long, simple and without megaseta, and gonocoxite with a very long inner process.

### 3. *Cricotopus bicinctus* (Meigen, 1818)

Three males were collected. No. 354:86 (#9:6), 355:44 (#14:11), 372:26 (#14:11:3)). Abdominal tergites I and IV pale. AR 1.38, 1.62, 1.50.

### 4. *Cricotopus bimaculatus* Tokunaga, 1936

A male was collected. No. 354:58 (#7:27). Abdominal tergites I and IV entirely pale, II largely pale and with a pair of dark spots in the anterior and lateral portions. WL 1.99 mm, AR 1.29.

### 5. *Cricotopus polyannulatus* Tokunaga, 1936

A male was collected by sweeping at Kunegawa on March 24. No. 354:56 (#7:25).

### 6. *Cricotopus tamapullus* Sasa, 1981

A male was collected by sweeping at Kunegawa on March 24. No. 354:44 (#7:13). BL 3.29mm, WL 1.74mm, WW/WL 0.28 (very narrow). Scutum, scutellum, postnotum and abdominal tergites and legs almost uniformly dark brown, abdominal tergite IV slightly paler. Eyes pubescent, each with a wedge-shaped dorsomedial extension, ER 1.00. Antenna with 13 flagellar segments, AR 0.94, AHR 0.52. P/H 1.00. SO 5:5, CL 12. Anteprepronotum united, with 3:3 lateral setae. DM 8, all minute, DL 32:32, all minute and decumbent, PA 4:4, SC 32 (very many). Wing membrane bare and smooth. Squama with 6:6 fringe hairs, RR 0.52, VR 1.18, R/Cu 1.08. Costa slightly produced beyond tip of R4+5. Cu2 slightly curved near the tip. fLR 0.50, mLR 0.43, hLR 0.52, fTR 0.14, fBR 1.4, mBR 2.0, hBR 2.5. Pulvilli vestigial. Anal point absent, posterior margin of ninth tergite broad and rounded, bearing short setae and without lobes. Inner lobe of gonocoxite single and thumb-like. Gonostylus with an obtuse preapical tooth.

**Remarks.** This specimen is a typical member of the subgenus *Cricotopus*, and is provisionally identified as *C. tamapullus* Sasa, 1981, but AR is smaller (1.05 in the type specimen), DL and SC are larger (25-27 and 20 in the types), and the numbers of setae on abdominal tergites are also larger.

### 7. *Cricotopus tamasimplex* Sasa, 1981

A male was collected by sweeping at Azugawa on March 23. No. 353:18 (#1:34). BL

2.64mm, WL 1.44mm, WW/WL 0.32. Ground color of scutum pale, stripes, scutellum and postnotum dark brown, abdominal tergites I, IV, IX and hypopygium pale, VII brown, II, III, V, VI and VIII largely dark brown and with narrow pale bands along oral and caudal margins; leg segments largely brown, but basal 3/4 of front tibia and basal 2/3 of middle tibia pale. Eyes pubescent, ER 0.87. Antenna with 13 flagellar segments, AR 0.98, AHR 0.49. Palp short, P/H 0.74. SO 0+3, 0+3, CL 7, PN 3:1. DM 14, all minute, DL 18:18, all minute and decumbent. PA 2:2, SC 12. SQ 8:8, RR 0.48, VR 1.15, R/Cu 1.05. fLR 0.66, mLR 0.51, hLR 0.56, fTR 0.14, fBR 2.4, mBR 1.9, hBR 1.9. Pulvilli absent. Anal point absent. Inner lobe of gonocoxite also absent. Gonocoxite with short and strong setae along inner margin. Gonostylus with a small preapical tooth.

**Remarks.** The above structures are almost coincident with that of *C. tamasimplex* recorded first from Tama River, Tokyo, and later from along two rivers in Toyama.

#### 8. *Cricotopus togacutus* Sasa et Okazawa, 1982

Three males were collected. No. 354:37,38 (#7:6,7), 356:46 (#7:7:2). BL 3.99, 4.34, 3.94 mm, WL 2.24, 2.38, 2.34mm, WW/WL 0.32, 0.34, 0.31. Scutum, scutellum and abdominal tergites almost entirely black, basal half of tibiae and basal 3/4 of front tarsus II yellow and other leg portions brown. Eyes pubescent, each with a wedge-shaped dorsomedial extension, ER 0.39, 0.69, 0.53. Antenna with 13 flagellar segments, AR 1.07, 1.08, 1.07, AHR 0.50, 0.54, 0.53. P/H 1.04, 1.21, 1.21. SO 7:7, 8:8, 11:11, CL 15, 18, 16. Antepronotum united, with 4:4, 4:4, 6:6 lateral setae. DM 28, 24, 22, all minute. DL 32:31, 32:36, 36:34, all minute and decumbent. PA 4:3, 4:4, 4:4, SC 12, 12, 12. Wing bare, SQ 10:10, 12:12, 12:12. RR 0.58, 0.52, 0.50, VR 1.09, 1.13, 1.13, R/Cu 1.10, 1.07, 1.14. fLR 0.58, 0.58, 0.57, mLR 0.47, 0.47, 0.45, hLR 0.53, 0.57, 0.55, fTR 0.12, 0.12, 0.11, fBR 1.4, 1.3, 1.4, mBR 1.5, 2.3, 1.4, hBR 1.7, 2.4, 1.6. Annal point absent, inner lobe of gonocoxite expanded distally like a foot, gonocoxite with a rectangular preapical tooth.

**Remarks.** This species was described with a male collected from a valley of Toga (Toyama), and this is the second record. The male can be differentiated from the related species by that abdominal tergites are entirely dark, tibiae with a long pale ring in the proximal half, tarsus II of front leg white, and other leg portions entirely dark, inner lobe of gonocoxite single and distally expanded like a foot, and gonostylus with a conspicuous rectangular preapical tooth. In the type specimen, WL is 1.90mm and AR is 0.68, but both are larger in the present specimens.

#### 9. *Cricotopus triannulatus* (Macquart, 1826)

A male was collected by sweeping at Kunegawa on March 24. No. 354:57 (#7:26). Gonocoxite with two separated inner lobes. Abdominal tergites I, IV and V pale. AR 1.31.

#### 10. *Cricotopus tusimoabeus* sp. nov. (Figs. 2 a-k)

Three males were collected Holotype: No. 353:95 (#5:14). Paratypes: No. 354:39 (#7:8), 356:28 (#5:14:2). Large midges as members of *Cricotopus*, BL 5.22, 4.74, 4.94mm, WL 2.94, 2.64, 2.80mm, wing narrow, WW/WL 0.27, 0.29, 0.29. Body almost entirely black. Head in Fig. 2 a. Eyes pubescent, ER 0.37, 0.50, 0.41, smaller than in their related species. Antenna with 13 flagellar segment, AR 1.74, 1.55, 1.47, larger than in related species. Palp short, P/H

0.94, 0.98, 0.99. SO 6:6, 4:4, 10:10, CL 8, 9, 6. Anteprenotum (Fig. 2 b) united, with 4:4, 4:4, 6:6 lateral setae. Distribution of setae on scutum and scutellum in Fig. 2 c. DM 26, 24, 24, all minute, DL 22:22, 30:32, 30:28, all minute and decumbent, PA 10:12, 8:8, 6:6. SC 8, 9, 6.

Wing (Fig. 2 d) bare, membrane smooth, SQ 43:44, 28:28, 44:44 (very many), anal lobe rectangular. Costa slightly extended beyond tip of R4+5. RR 0.63, 0.53, 0.56, VR 1.19, 1.20, 1.20, R/Cu 1.02, 1.05, 1.07. Cu2 nearly straight. Tip of front tibia (Fig. 2 e) with a long spur, tip of middle tibia (Fig. 2 f) with two short spurs, tip of hind tibia (Fig. 2 g) with a long and a short spur, and a comb composed of 16 free spines. fLR 0.69, 0.70, 0.69 (higher than in related species), mLR 0.55, 0.52, 0.53, hLR 0.58, 0.60, 0.57, fTR all 0.14, fBR 2.1, 1.4, 2.4, mBR 2.8, 3.1, 3.1, hBR 2.7, 3.3 3.3. Pulvilli absent (Fig. 2 h, hind tarsus V).

Abdominal tergites with relatively large numbers of setae, 44 on I, 46 on II and III. Hypopygium in Fig. 2 i. A small, Y-shaped anal point is present (also in Fig. 2 j). Inner lobe of gonocoxite (Fig. 2 j) much longer than wide and apically rounded. Gonostylus widest at about basal 1/3 and tapering towards apex, without preapical tooth.

**Remarks.** This species is structurally a typical member of the subgenus *Cricotopus*, but is quite unusual in that it has a distinct anal point, and is also characterised in that body almost entirely black, AR is large and ER is small, inner lobe of gonocoxite is long, narrow and rounded, and gonostylus is widest at about basal 1/3 and tapering towards apex, without preapical tooth.

### 11. *Cricotopus yatabensis* Sasa, 1979

Three males were collected. No. 371:44, 45 (#7:13:3,4), No. 371:65 (#11:15:3). BL 3.12, 2.86, 3.37mm, WL 1.64, 1.47, 1.73mm, WW/WL 0.30, 0.32, 0.31. Body and leg segments almost uniformly dark brown, abdominal tergite IV slightly paler. Eyes pubescent, ER 1.00, 0.96, 1.03. Antenna with 13 flagellar segments, AR 0.82, 0.88, 0.85, AHR 0.48, 0.46, 0.48. P/H 0.86, 0.86. SO 4:4, 4:4, 6:6, CL 10, 12, 8. Anteprenotum united, with 2:2, 5:5, 3:3 lateral setae. DM 20, 20, 16, all minute. DL 36:36, 32:34, 36:38, all minute and decumbent. PA all 4, SC 32, 30, 28. Wing membrane bare but conspicuously granular, SQ 16:16, 21:20, 16:14. Anal lobe obtuse. Costa slightly extending beyond tip of R4+5. RR 0.52, 0.55, 0.57, VR 1.18, 1.21, 1.16, R/Cu 1.06, 1.06, 1.03. fLR 0.50, 0.51, 0.51, mLR 0.44, 0.42, 0.43, hLR 0.51, 0.50, 0.51, fTR 0.13, 0.15, 0.14, fBR 1.2, 2.2, 1.4, mBR 1.5, 2.2, 2.1, hBR 1.6, 2.4, 2.4. Pulvilli absent. Ninth tergite with a pair of low and rounded lobes on posterior margin. Inner lobe of gonocoxite single and rounded. Gonostylus with a small preapical tooth.

**Remarks.** The above morphological characters are almost coincident with that of *C. yatabensis* Sasa, 1979, recorded first from Tsukuba, Ibaraki, and later from several localities in central Honshu (Sasa and Kikuchi, 1995, p. 55).

### 12. *Paratrachocladus rufiventris* (Meigen, 1830)

Nine males were collected. No. 353:19, 20 (#1:21,22), 353:49-51 (#3:8,10,11), 355:05 (#11:15), 356:06 (#1:21:2), 356:18 (#2:5:2), 356:55 (#11:15:2). WL 1.73-2.11 (1.97 in average of 9)mm, ER 0.41-0.77 (0.62), AR 1.13-1.37 (1.21), fLR 0.60-0.66 (0.63). This is another cosmopolitan species of the *Cricotopus* complex, and has been collected from many localities in northern Honshu to Kyushu (Sasa and Kikuchi, 1995, p. 57).

### 13. *Paratrachocladus tusimobeceus* sp. nov. (Figs. 3 a-j)

A male was collected by sweeping at Kunegawa on March 24. Holotype: No. 354:42 (#7:11). BL 3.24mm, WL 1.63mm, WW/WL 0.35. Scutum and postnotum black, scutellum and legs brown, abdominal tergites dark brown. Head in Fig. 3 a. Eyes highly pubescent, oval or reniform, ER 1.16. Antenna with only 12 flagellar segments, last segment very short, AR 0.31 (very small), AHR 0.30. P/H 1.06. SO 0+3, 0+3, CL 16. Anteprenotum (Fig. 3 b) united, with 2:2 lateral setae. Distribution of setae on scutum and scutellum in Fig. 3 c; DM 12, all minute, DL 10:13, all long, stout and arising on large pale pits, PA 4:4, SC 12. Humeral pits absent.

Wing bare, smooth, venation in Fig. 3 d. Squama with 16:16 fringe hairs. R2+3 separated, RR 0.31. Costa extending much beyond tip of R4+5, which is distal to tip of Cul, R/Cu 1.06. VR 1.21. Cu2 nearly straight. Tip of front tibia (Fig. 3 e) with a long spur, tip of middle tibia (Fig. 3 f) with two short spurs, tip of hind tibia (Fig. 3 g) with a long and a short spur, and a comb composed of 12 free spines. Tarsi without pseudospurs. fLR 0.61, mLR 0.45 (very small), hLR 0.52, fTR 0.12, fBR 2.4, mBR 2.4, hBR 2.6. Pulvilli large and brush-like (Fig. 3 h, hind tarsus V).

Setae on abdominal tergites (Fig. 3 i) are 18 on I, 28 on II, 26 on III, and 24 on IV to VII, and those on II to VII are arranged into two transverse rows. Hypopygium in Fig. 3 j. Anal point and virga absent, posterior margin of ninth tergite rounded and chitinized, with 6 marginal setae. Inner lobe of gonocoxite broad and roughly rectangular, with 3 short setae on posterior margin. Gonostylus widest at about middle, inner margin slightly concave, without preapical tooth.

**Remarks.** This specimen belongs to the genus *Paratrachocladus* Santos Abreu, 1918, since eyes are pubescent, dorsomedian setae are well developed and arising from large pale pits, squama fringed, R2+3 separated, Cu2 nearly straight, and anal point is absent. However, it is quite unusual as a member of this genus in that antenna with only 12 flagellar segments and AR is very low, scutum is entirely black and without humeral pits, setae on abdominal tergites II to VII are arranged into two transverse rows, and inner lobe of gonocoxite is broad and rectangular. It is somewhat related to *P. yamashiroprimus* Sasa, 1994, in that legs with large brush-like pulvilli, eyes without dorsomedial extension, but in the latter AR is 1.22, DM absent, posterior margin of ninth tergite is quadrangularly produced, and gonostylus is rectangularly curved.

### 14. *Paratrachocladus tusimocedeus* sp. nov. (Figs. 4 a-i)

A male was collected by sweeping at Kechi Dam on March 25. Holotype: No. 355:23 (#12:6). BL 3.12mm, WL 1.79mm, WW/WL 0.31. Scutum with a pair of large humeral pits, other scutal areas, scutellum and postnotum black, legs almost uniformly brown, abdominal tergites largely dark brown but tergite I and IV brown and slightly paler. Head in Fig. 4 a. Eyes pubescent, ER 0.57. Antenna with 13 flagellar segments, AR 0.93, AHR 0.41. P/H 1.15. SO 6:6, CL 12. Anteprenotum (Fig. 4 b) narrowly united, with 1:1 lateral seta. Setae on scutum and scutellum in Fig. 4 c; DM 20, all minute; DL 21:20, all short but arising on large pale pits; PA 3:3, SC 12.

Wing (Fig. 4 d) bare, smooth, squama with 8:8 fringe hairs, angle of anal lobe nearly rectangular. RR 0.55, VR 1.06, R/Cu 1.05. Costa slightly extended beyond tip of R4+5. Cu2 nearly straight. Tip of front tibia (Fig. 4 e) with a long spur, tip of middle tibia (Fig. 4 f) with two short spurs, tip of hind tibia (Fig. 4 g) with a long and a short spur, and a comb composed of 13 free spurs. fLR 0.64, mLR 0.51, hLR 0.57, fTR 0.14, fBR 2.6, mBR 2.8, hBR 3.2. Pulvilli present, small but brush-like.

Setae on abdominal tergites (Fig. 4 h) are 30 on I to III, 26 on IV and V, and 22 on VI to VIII, and those on II to VII are arranged in two transverse rows. Hypopygium in Fig. 4 i. Anal point absent, posterior margin of ninth tergite rounded, without marginal setae. Inner lobe of gonocoxite roughly rectangular and with 10 short setae. Gonostylus strongly expanded in the middle, inner margin convex, megaseta long, narrow and pointed, without preapical tooth.

**Remarks.** This specimen is structurally a typical member of the genus *Paratrachocladus* Santos Abreu, 1918, and somewhat related to *P. yamashiroprimus* Sasa, 1994, in that pulvilli present, eyes reniform and without dorsomedial extension, and inner lobe of gonocoxite is rectangular, but the latter differs from the present species in that AR is 1.22 and larger, ER is 1.15, 1.26 and larger, ninth tergite with a quadrangular lobe on posterior margin, inner lobe of gonocoxite is rounded, and gonostylus is rectangularly curved near apex.

#### 15. *Paratrachocladus tusimodeeus* sp. nov. (Figs. 5 a-k)

A male was collected by sweeping at Izumi on March 26. Holotype: No. 355:64 (#15:19). BL 3.18mm, WL 1.86mm, WW/WL 0.32. Scutum with a pair of large pale humeral pits, scutal stripes, scutellum and postnotum black. Legs largely yellow, but front femur and distal half of middle and hind femora brown. Abdominal tergites largely dark brown but II to VI each with a narrow yellow band along oral margin. Head in Fig. 5 a. Eyes pubescent, ER 0.64. Antenna with 13 flagellar segments, AR 0.98, AHR 0.53. P/H 1.10. SO 4:4, CL 14. Anteprepronotum (Fig. 5 b) united, with 1:1 lateral seta. DM present, all minute (unable to count due to dark color). DL 29:30, all well developed and arising on large pale pits. PA 4:4, SC 12.

Wing in Fig. 5 d. Squama with 6:6 fringe hairs. RR 0.51, VR 1.11, R/Cu 1.06. Costa slightly extended beyond tip of R4+5. Cu2 almost straight, curved near tip. Anal lobe obtuse. Tip of front tibia (Fig. 5 e) with a long spur, tip of middle tibia (Fig. 5 f) with two short spurs, tip of hind tibia (Fig. 5g) with a long and a short spur, and a comb composed of 11 free spines. fLR 0.64, mLR 0.51, hLR 0.57, fTR 0.13, fBR 1.4, 2.3, 2.3. Pulvilli absent.

The numbers of setae on abdominal tergites (Fig. 5 h) are 32 on I and II, and 28 on III to VIII, and those of II to VII are distributed roughly on two transverse rows. Hypopygium in Fig. 5 i. Anal point absent, ninth tergite without setae and lobes on posterior margin. Inner lobe of gonocoxite (Figs. 5 j; dorsal, k, ventral view) double layered, with short setae and microtrichia on both sides. Gonostylus simple, widest near apex, without preapical tooth.

**Remarks.** This specimen is also a typical member of the genus *Paratrachocladus*, since eyes pubescent, dorsolateral setae of scutum arising on large pale pits, squama fringed, Cu2 nearly straight, and anal point is absent. It is very closely related to the above species but



differs especially in the structure of inner lobe of gonocoxite being double layered, the numbers of dorsomedian setae of scutum are larger and arising on larger pale pits, and pulvilli are absent.

**16. *Rheocricotopus (Paracricotopus) tusimoeus* sp. nov.** (Figs. 6 a-j)

A male was collected by sweeping at Uchiyama on March 24. Holotype: No. 354:03 (#5:22). BL 2.62mm, WL 1.46mm, WL1.46mm, WW/WL 0.34. Scutum with a pair of large humeral pits (HP in Fig. 6 c), other scutal areas, scutellum and postnotum black, legs almost uniformly brown, abdominal tergites uniformly dark brown. Head in Fig. 6 a. Eyes pubescent, reniform, ER 1.11. Antenna with 13 flagellar segments, AR 0.56, AHR 0.45. P/H 1.02. SO 0+2:0+2, CL 8. Anteprenotum (Fig. 6 b) united, with 2:2 lateral setae. Distribution of setae on scutum and scutellum in Fig. 6 c. DM 10, all minute. DL 7:8, all well developed and arising on large pale pits. PA 3:3l, SC 6.

Wing bare, smooth, venation in Fig. 6 d. Squama with 8:10 fringe hairs. Anal lobe obtuse. Costa extending beyond tip of R4+5. R2+3 separated, RR 0.41. VR 1.11, R/Cu 1.02. Cu 2 nearly straight. Tip of front tibia (Fig. 6 e) with a long spur, tip of middle tibia (Fig. 6 f) with two short spurs, tip of hind tibia (Fig. 6 g) with a long and a short spur, and a comb composed of 13 free spines. fLR 0.62, mLR 0.48, hLR 0.54, fTR 0.16, fBR 2.4, mBR 2.9, hBR 3.3. Pulvilli brush-like (Fig. 6 h, front tarsus V).

Setae on abdominal tergites in Fig. 6 i, 18 on I, 24 on II to VI, 20 on VII and VIII, and those on II to VII are distributed in two transverse rows. Hypopygium in Fig. 6 j. Anal point triangular and situated on the posterior margin of ninth tergite, entirely clothed with microtrichia but without setae. Inner lobe of gonocoxite obtusely angulate, with short setae and microtrichia. Gonostylus nearly straight, with a small, rectangular preapical tooth.

**Remarks.** This specimen belongs to the *Cricotopus* complex in general structure, especially in that eyes pubescent, wing bare, and squama fringed, and to the genus *Rheocricotopus* Thienemann et Harnisch, since dorsolateral setae are well developed and anal point is present, and further to the subgenus *Paracricotopus* Thienemann et Harnish, since setae on abdominal tergites II to VII are arranged into two transverse rows. It is most closely related to *R. togakuroasi* Sasa et Okazawa, 1992, in that large humeral pits are present, and inner lobe of gonocoxite is broad and nearly rectangular, but the latter differs essentially from the present species in that anal point is very narrow and apically pointed, and gonostylus without preapical tooth. This species is also unusual as a member of this genus in that anal point is entirely covered by microtrichia but without lateral setae.

**17. *Rheocricotopus (Paracricotopus) tamabrevis* Sasa, 1983** (Figs. 7 a-c)

A male was collected by sweeping at Kunegawa on March 24. Holotype: No. 354:51 (#7:20). BL 3.04mm, WL 1.52mm, WW/WL 0.34. Body almost entirely dark brown or black, only the humeral areas of scutum slightly paler. Head in Fig. 7 a. Eyes pubescent, reniform and without dorsomedial projection, ER 1.00. Antenna with 13 flagellar segments, last segment very short and without apical seta, AR 0.33, AHR 0.25. P/H 1.05. SO 0+2:0+2 (no inner group, with only 2 lateral group). CL 12. Anteprenotum united, with 2:2 lateral setae. DM 8, all minute. DL 7:8, all well developed and arising on large pale pits. PA 3:3, SC 12.

Wing membrane bare, brownish, smooth, squama with 16:14 fringe hairs, anal lobe obtuse. Costa extending beyond tip of R4+5. Cu2 nearly straight. RR 0.32, VR 1.13, R/Cu 1.11. Tip of front tibia with a long spur, tip of middle tibia with two short spurs, tip of hind tibia with a long and a short spur, and a comb composed of 15 free spines. fLR 0.64, mLR 0.47, hLR 0.53, fTR 0.15, fBR 2.8, mBR 2.7, hBR 1.9.

Abdominal tergites (Fig. 7 b) with relatively small numbers of setae, 30 on I, 24 on II to IV, 28 on V, 32 on VI, 34 on VII, and 36 on VIII, and those on II to VII are arranged into two oral and caudal transverse rows. Hypopygium in Fig. 7 c. Anal point prominent, widest and base and tapering towards sharply pointed apex, with 4 lateral setae and 2 basal setae, somewhat like in that of subgenus *Orthocladius*. Virga simple and V shaped. Inner lobe of gonocoxite nearly rectangular, with 4 marginal and 2 dorsal short setae, with microtrichia on basal, inner and posterior portions but largely bare. Gonostylus simple, with a small agulate preapical tooth.

**Remarks.** This specimen is morphologically a typical member of genus *Rheocricotopus*, and is classified into the subgenus *Paracricotopus* in that setae on abdominal tergites II to VI are distributed into two transverse rows. This specimen is closely related to two species of this subgenus recorded from Japan, *R. tamabrevis* Sasa, 1983, recorded already from 4 localities of Japan, and to *R. iregularis* (Niitsuma, 1990), in Shizuoka, especially in that AR is only about 0.3, anal point is narrow, sharply pointed apically and with lateral setae, and body largely black or dark brown, and is provisionally identified as belonging to the former species. The above two species seem to be unable to differentiate in adult males according to the descriptions of the above two original papers.

#### 18. *Eukiefferiella kurobekeyakia* Sasa et Okazawa, 1992 (Figs. 8 a-j)

A male was collected by sweeping at the side of Nitagawa on March 26. Holotype: No. 355:91 (#17:7). BL 1.88mm, WL 1.02mm, WW/WL 0.34. Body largely yellow, scutal stripes and postnotum brown. Head in Fig. 8 a. Eyes pubescent, reniform, ER 1.19. Antenna with only 12 flagellar segments, AR 0.45, AHR 0.45. Palp short, P/H 0.90. SO 3:3, CL 4. Anteprepronotum (Fig. 8 b) united, with 1:1 lateral seta. Distribution of setae on scutum and scutellum in Fig. 8 c, DM 0, DL 5:5, SC 4.

Wing bare, membrane plain, venation in Fig. 8 d. Squama bare, R2+3 in contact with R4+5, VR 1.39, R/Cu 0.90. Costa extended beyond tip of R4+5. Cu2 slightly curved. Tip of front tibia (Fig. 8 e) with a long spur, tip of middle tibia (Fig. 8 f) with 2 short spurs, tip of hind tibia (Fig. 8 g) with a long spur, and a comb composed of 16 free spines. Pulvilli absent.

Abdominal tergites with very small numbers of setae, mostly 8 on II to VIII. Hypopygium in Fig. 8 h. Anal point (also in Fig. 8 i) long, narrow, widest and base and tapering towards pointed apex, largely bare but with microtrichia on base and a pair of basal setae. Basal lobe of gonocoxite (Fig. 8 i) very long and narrow. Gonostylus (Fig. 8 j) simple, with a conspicuous rounded preapical tooth.

**Remarks.** This specimen belongs to the *tokuokasia* group of genus *Eukiefferiella*, since R2+3 in contact with R4+5, squama bare, eyes pubescent, and anal point is present. The above described morphological characters are almost coincident with that of *E. kurobekeyakia*

Sasa et Okazawa, 1992, recorded with a single male collected at an upstream site of Kurobe River, Toyama, and especially characteristic are the rectangularly curved gonostylus, long and apically pointed anal point, and very long inner lobe of gonocoxite. In the type specimen, anteprenotum has no lateral seta, while one lateral seta is present in the present specimen.

**19. *Eukiefferiella tamaflava* Sasa 1981** (Fig. 10 a)

Seven males were collected by sweeping, No. 353:21, 22 (#1:24,35), 353:52 (#3:15), 354:89 (#10:8), 356:06 (#1:24:2), 356:38, 39 (#5:18:3,4). BL 2.26-2.72 (2.48 in average of 7)mm, WL 1.34-1.48 (1.44)mm, WW/WL 0.30-0.34 (0.33). Eyes bare, ER 1.10-1.57 (1.43). Antenna with 13 flagellar segments, AR 0.47-0.78 (0.55), AHR 0.34-0.47 (0.39). Palp short, P/H 0.84-0.97 (0.91). SO all 4, with an exception of 5 in one case. CL 5-8 (7.0). PN 0, 1 or 2 (mean 0.9, most frequently 1). DM all 0, DL 8-12 (10.1), PA 3 (4 in one case), SC 4 or 6 (5.0). Squama with 3-5 (3.9) fringe hairs. R2+3 in contact with R4+5. VR 1.24-1.50 (1.41), R/Cu 0.93-0.97 (0.95). fLR 0.68-0.75 (0.72), mLR 0.48-0.51 (0.49), hLR 0.55-0.59 (0.55), fTR 0.14-0.17 (0.15), fBR 1.6-3.6 (3.0), mBR 2.8-3.8 (3.4), hBR 3.9-5.7 (4.9). Hypopygium in Fig. 10 a. Anal point long, narrow, V-shaped and apically pointed, with two basolateral setae. Virga composed of two codes situated on a cup. Inner lobe of gonocoxite broad and rounded. Gonostylus straight, with a small rectangular preapical tooth.

**Remarks.** This species was recorded first from Tama River, Tokyo, and later from Jinzu River, Toyama, by Sasa and Okazawa (1990), and at Asama Onsen, Nagano, by Sasa and Hirabayashi (1993). This species represent the *tamaflava* group of genus *Eukiefferiella* in the sense of Sasa and Kikuchi (1995, p.157), since R2+3 is in contact with R4+5, squama is bare, and anal point is present.

**20. *Eukiefferiella tusimofegea* sp. nov.** (Figs. 9 a-h)

A male was collected by sweeping at Toyo on March 26. Holotype: No. 355:82 (#16:13). BL 2.74mm, WL 1.74mm, WW/WL 0.31. Scutal stripes and postnotum brown, scutellum and abdominal tergites brownish yellow, legs yellow. Head in Fig. 9 a. Eyes bare, reniform, ER 1.11. Antenna with 13 flagellar segments, AR 1.00, AHR 0.46. P/H 0.98. SO 0+5, 0+5, CL 9. Anteprenotum (Fig. 9 b) united in the middle, with 1:0 lateral seta. Distribution of setae on scutum and scutellum in Fig. 9 c; DM 0, DL 6:7, PA 3:4, SC 4.

Wing in Fig. 9 d. SQ 8:6, R2+3 in contact with R4+5. VR 1.35, R/Cu 1.03. Cu2 nearly straight. Tip of front tibia (Fig. 9 e) with a long spur, tip of middle spur (Fig. 9 f) with two short spurs, tip of hind tibia (Fig. 9 g) with a long and a short spur, and a comb composed of 11 free spines. fLR 0.80, mLR 0.51, hLR 0.73, fTR 0.14, fBR 1.4, mBR 2.2, hBR 5.3. Pulvilli absent.

Setae on abdominal tergites are rather small in the numbers, and distributed almost evenly, 32 on I, 34 in II, 36 on III and IV, 32 on V, 30 on VI, 28 on VII. Hypopygium in Fig. 9 h. Posterior margin of ninth tergite slightly produced in the middle but without anal point. Inner lobe of gonocoxite large, nearly circular, and with numerous short setae along posterior margin. Gonostylus long, nearly straight and parallel-sided.

**Remarks.** This species belongs to the *yasunoi* group of genus *Eukiefferiella*, since R2+3 is in contact with R4+5, squama fringed, eyes bare, and anal point is absent. It is

somewhat related to *E. togauprima* Sasa et Okazawa, 1992, in that DM setae are absent, and inner lobe of gonocoxite without long setae, but it differs from the present species in that AR is 0.36-0.46, R/Cu <1.0, inner lobe of gonocoxite is broad and rounded, and gonostylus is much shorter and with a prominent preapical tooth.

**21. *Eukiefferiella tusimogehea* sp. nov.** (Figs. 11 a-j)

Two males were collected at Izumi on March 26. Holotype: No. 355:65 (#15:20). Paratype: No. 355:66 (#15:21). BL 2.06, 1.68mm, WL 1.14, 1.06mm, WW/WL 0.35, 0.36 (very wide). Scutum largely pale, scutal stripes, scutellum and abdomen brown, postnotum dark brown, legs brownish yellow. Head in Fig. 11 a. Eyes pubescent, reniform, ER 1.42, 1.44. Antenna with 13 flagellar segments, last segment very short, AR 0.40, 0.28, AHR 0.37, 0.28. Palp short, P/H 0.89, 0.88. SO 4:4, 4:4, CL 6:4. Anteprenotum (Fig. 11 b) narrowly united, with 1:1, 1:1 lateral seta. Distribution of setae on scutum and scutellum in Fig. 11 c; DM 6, 11, all minute; DL 6:6, 6:6, SC 4, 4.

Wing membrane bare, squama bare, venation in Fig. 11 d. R2+3 in contact with R4+5. Tip of R4+5 much proximal to tip of Cul, R/Cu 0.88, 0.81. Costa extended much beyond tip of R4+5. FCu much distal to R-M, VR 1.37, 1.51. Cu2 nearly straight. Tip of front tibia (Fig. 11 e) with a long spur, tip of middle tibia (Fig. 11 f) with two short spurs, tip of hind tibia (Fig. 11 g) with a long and a short spur, and a comb composed of 12 free spines. fLR 0.45, 0.45 (very small), mLR 0.47, 0.45, hLR 0.51, 0.44, fTR 0.14, 0.15, fBR 1.6, 1.8, mBR 2.8, 2.6, hBR 3.2, 2.8. Pulvilli absent.

Distribution of setae on abdominal tergites in Fig. 11 h, the numbers are very small, 4 on I, 8 on II and III, and 6 on IV to VIII. Hypopygium in Fig. 11 i. Anal point (also in Fig. 11 j) nearly conical but with rounded margin, almost entirely clothed with microtrichia, and with 2 pairs of basal setae. Virga present, composed of some 6 fibers. Inner lobe of gonocoxite small and rounded (Fig. 11 j). Gonostylus simple, nearly straight, without preapical tooth.

**Remarks.** This species is also a member of the *tokuokasia* group of genus *Eukiefferiella* in the sense of Sasa and Kikuchi (1995, p. 157), since R2+3 is in contact with R4+5, squama bare, eyes pubescent, and anal point is present. However, it differs from *E. kurobekeyakia* in the shape of anal point being low, broad and conical, and gonostylus is straight and without preapical tooth. The present species is somewhat related to *E. tokuokasia* Sasa, 1989, in that antenna with 13 flagellar segments, R/Cu <1.0, gonostylus is straight and without preapical tooth, but the latter differs essentially from the present species in that anal point is long, narrow, apically pointed and bare, inner lobe of gonocoxite is angulate, and AR is 0.71 (larger).

**22. *Eukiefferiella tusimoheia* sp. nov.** (Figs. 12 a-k)

Six males were collected. Holotype: No. 355:14 (#11:24). Paratypes: 353:24 (#1:37), 355:81 (#16:12)), 356:15, 16 (#1:37:2, 3), 356:59 (#11:24:2). BL 1.52-1.84 (1.69 in average of 6) mm, WL 0.86-1.12 (0.98)mm, WW/WL 0.42-0.44 (0.43, very wide). Scutal stripes and postnotum brown, other body portions largely yellow. Head in Fig. 12 a. Eyes highly pubescent, reniform, ER 1.14-1.32 (1.21). Antenna with 10 (in 3), 11 (in 2) or 12 (in 1) flagellar segments,

AR 0.43-0.79 (0.62), AHR 0.42-0.44 (0.43). Palp short, P/H 0.70-0.88 (0.81). SO 3-6 (4.0, most frequently 4), CL 4-6 (4.5). Anteprenotum (Fig. 12 b) very narrowly united in the middle, with 1 or 2 (1.4) lateral setae. Distribution of setae on scutum and scutellum in Fig. 12 c. DM all 0, DL 5-9 (6.5, most frequently 6), PA all 3, SC all 4. Wing (Fig. 12 d) very wide, membrane bare. Squama bare. R2+3 separated, RR 0.43-0.49 (0.47). VR 1.28-1.40 (1.34). Tip of R4+5 much proximal to tip of Cul, R/Cu 0.83-0.86 (0.84). Tip of front tibia (Fig. 12 e) with a long and basally curved spur, tip of middle tibia (Fig. 12 f) with only one short spur, tip of hind tibia (Fig. 12 g) with a long spur, and a comb composed of 14-16 free spurs, but without a short spur. fLR 0.46-0.50 (0.47), mLR 0.47-0.52 (0.48), hLR 0.48-0.51 (0.49), all very short. fTR 0.10-0.13 (0.12), fBR 1.4-2.6 (1.9), mBR 1.9-3.6 (2.5), hBR 2.3-3.0 (2.7). Pulvilli absent.

Abdominal tergites (Fig. 12 h) with very small numbers of setae, 4 on I, and 6 on II to VI, in the holotype. Hypopygium in Fig. 12 i. Posterior margin of ninth tergite with a pair of low and rounded lobes flanking anal point. Anal point (Fig. 12 j) widest at base, distal horn narrow and apically pointed, with microtrichia on basal 1/3 but distal horn bare. Inner lobe of gonocoxite (also in Fig. 12 j) long, with rounded posterior margin. Gonostylus (Fig. 12 k) simple, with a small preapical tooth. Virga absent.

**Remarks.** This species belongs to the *amamipubescia* group of genus *Eukiefferiella* of Sasa and Kikuchi, 1995 (page 157), since R2+3 is separated, squama bare, and eyes are pubescent. Only one species, *E. amamipubescia* Sasa, 1990, was recorded from Amami Island, but it differs essentially from the present species in that tip of R4+5 is distal to tip of Cul (R/Cu <1.0), with 10 or more DM, LR much larger, and anal point is clothed with microtrichia towards the tip.

### 23. *Eukiefferiella tusimoijsa* sp. nov. (Figs. 13 a-j)

Three males were collected by sweeping on March 25. Holotype: No. 355:01 (#11:11). Paratypes: No. 356:66, 67 (#14:2:2, 3). Scutum, scutellum and postnotum almost entirely black, other body portions almost uniformly brown. BL 4.18, 3.66, 3.64mm, WL 2.33, 2.46, 2.18mm, WW/WL 0.28, 0.26, 0.27. Head in Fig. 13 a. Eyes bare, reniform, ER 0.72, 0.96, 0.84. Antenna with 13 flagellar segments, AR 2.04, 2.04, 2.11, AHR 0.66, 0.61, 0.63. P/H 1.27, 1.20, 1.04. SO 7:7, 6:6, 4:4, CL 22, 16, 16. Anteprenotum (Fig. 13 b) united, PN all 4. Distribution of setae on scutum and scutellum in Fig. 13 c; DM all 0, DL 5:5, 6:6, 6:6, PA all 3, SC all 10.

Wing membrane bluish, finely granular, venation in Fig. 13 d. SQ 16:17, 16:16, 16:16. Anal lobe strongly produced inwards. Costa slightly extended beyond tip of R4+5. R2+3 separated, RR 0.41, 0.44, 0.39, VR 1.06, 1.10, 1.09, R/Cu 1.12, 1.10, 1.09. Tip of front tibia (Fig. 13 e) with a long spur, tip of middle tibia (Fig. 13 f) with two short spurs, tip of hind tibia (Fig. 13 g) with a long and a short spur, and a comb composed of 12 free spines. fLR 0.76, 0.74, 0.76, mLR 0.53, 0.51, 0.52, hLR 0.57, 0.54, 0.56, fTR 0.13, 0.13, 0.15, fBR 2.2, 1.6, 2.5, mBR 2.3, 1.6, 2.3, hBR 2.4, 2.4, 3.6. Tips of tarsi I of middle and hind legs with two terminal spurs, other tarsi without terminal spur. Small, brush-like pulvilli present in all legs.

Abdominal tergites with relatively large numbers of setae, 60 on I, 76 on II (Fig. 13 h), 70 on III and IV, 60 on V and VI, 56 on VII, and 48 on VIII. Hypopygium in Fig. 13 i, and enlarged view of virga, anal point, inner lobes of gonocoxite, and gonostylus in Fig. 13 j. Anal point broad and triangular, apically pointed, and entirely clothed in microtrichia and numerous short setae. Virga conspicuous, composed of 8 simple codes of about 48 microns long. Inner lobes of gonocoxite double, both broad and low, clothed with short setae and microtrichia. Gonostylus wide, curved inwards, with a peculiar darkly pigmented small plate near apex, with megaseta, but without preapical tooth.

An additional paratype, No. 355:25 (#13:1) was collected by sweeping on March 25 at Tamazuke. BL 4.23, WL 2.56mm, WW/WL 0.27. ER 0.82, AR 1.86, AHR 0.56. SO 6:6, CL 20, PN 6:6, DM 0. DL 8:9, PA 5:5, SC 10, SQ 24:26, RR 0.43, VR 1.11, R/Cu 1.07, fLR 0.74, mLR 0.55, hLR 0.55, FTR 0.13, fBR 2.1, mBR 2.2, hBR 2.3.

**Remarks.** These specimens belong to the subfamily Orthoclaadiinae, and is provisionally classified into the *tamaparvula* group of genus *Eukiefferiella* Thienemann, 1926, since the general structure is the *Orthocladus* type, eyes reniform, R2+3 separated, Cu2 nearly straight, R/Cu >1.0, squama fringed, and small anal point without lateral setae is present. However, this species is quite unusual as a member of this group in that eyes are pubescent, anal point is clothed in microtrichia, inner lobe of gonocoxite is double, and gonostylus with a unusual horn-like chitinized process which has not been observed in other previously known species.

#### 24. *Eukiefferiella tusimoijskea* sp. nov. (Figs. 14 a-h)

A male was collected by sweeping at Sumogawa on March 25. No. 355:07 (#11:17). BL 2.81mm, WL 1.63mm, WW/WL 0.33. Scutal stripes and postnotum dark brown, other body portions largely brownish yellow. Head in Fig. 14 a. Eyes bare, reniform, ER 1.25. Antenna with 13 flagellar segments, AR 0.91, AHR 0.51, with 4 curved subapical sensory setae. P/H 0.91. SO 1+6:1+6, CL 6. Anteprepronotum (Fig. 14 b) united in the middle, without lateral seta. DM 0, DL 8:8, PA 3:3, SC 6.

Wing bare, smooth, venation in Fig. 14 c. Squama with 6:6 fringe hairs, anal lobe almost rectangular. R2+3 separated, RR 0.52. VR 1.35, R/Cu 0.95. Tip of front tibia (Fig. 14 d) with a long and straight spur, tip of middle tibia (Fig. 14 e) with two short spurs, tip of hind tibia (Fig. 14 f) with a long and a short spur, and a comb composed of 11 free spines. fLR 0.60, mLR 0.49, hLR 0.54, fTR 0.15, fBR 2.2, mBR 2.8, hBR 3.1. Pulvilli absent.

Distribution of setae on abdominal tergites in Fig. 14 g, the numbers are 52 on I, 56 on II to IV, 48 on V, and 40 on VI to VIII. Hypopygium in Fig. 14 h. Anal point small, triangular and hyaline, without microtrichia except at the base. Inner lobe of gonocoxite small, finger-like and with 4 short setae. Gonostylus wide, oval in shape, without preapical tooth.

**Remarks.** This specimen belongs to the *tamaparvulus* group of genus *Eukiefferiella*, or to the genus *Synorthocladus* Thienemann, 1935, in wider sense, since eyes bare and without dorsomedial projection, antenna with a few curved sensory setae subapically, R2+3 separated, tip of R4+5 slightly proximal to tip of Cu1, Cu2 straight, and small hyaline anal point is

present. However, it differs from the European type species of this genus, *S. semivirens* (Kieffer), in that anal point is lower, broader and apically rounded, and gonostylus is broader and without preapical swelling (cf. Pinder, 1978, Fig. 118B). It is most closely related to *S. tamaparvulus* Sasa, 1981, among the species of this group recorded from Japan, but the latter differs from the present species in that AR is 0.60-0.68 and smaller, and anal point is narrower and apically pointed. In the present paper, the generic name *Synorthocladus* is reserved until the studies on the classification of the *Eukiefferiella* complex be completed.

**25. *Eukiefferiella tusimokelea* sp. nov.** (Figs. 15 a-g)

A male was collected by sweeping at Azugawa on March 23. No. 353:23 (#1:27). BL 2.96mm, WL 1.65mm, WW/WL 0.34. Scutal stripes and postnotum black, scutellum, abdominal tergites and legs brown, Head in Fig. 15 a. Eyes bare, reniform, ER 1.26. Antenna with 13 flagellar segments, AR 0.88, AHR 0.46. Palp short, P/H 0.81. SO 0+6:0+6, CL 4. Anteprenotum united, without lateral seta. DM 0, DL 6:6, PA 3:3, SC 4. Wing bare, smooth, venation in Fig. 15 b. Squama with 5:5 fringe hairs. R2+3 separated, RR 0.58. Costa extended beyond tip of R4+5, which is slightly proximal to tip of Cul, R/Cu 0.96. VR 1.23. Tip of front tibia (Fig. 15 c) with a long spur, tip of middle tibia (Fig. 15 d) with two short spurs, tip of hind tibia (Fig. 15 e) with a long and a short spur, and a comb composed of 12 free spines. fLR 0.64, mLR 0.50, hLR 0.54, fBR 2.4, mBR 3.1, hBR 3.4. Pulvilli absent.

Distribution of setae on abdominal tergites in Fig. 15 f, 28 on I, 32 on II and III, 30 on IV, 24 on V and VI, 22 on VII and 20 on VIII. Hypopygium in Fig. 15 g. Anal point small, narrow, nearly parallel-sided and apically rounded, with a pair of lateral setae arising at about middle, and 2 pairs of basal setae. Inner lobe of gonocoxite long, narrow and finger-like, with short marginal setae.

**Remarks.** This specimen is also classified into the *tamaparvula* group of genus *Eukiefferiella* in wider sense, since eyes are bare, without dorsomedial extension, antenna with several sensory setae on the apical portion, R2+3 separated, squama with fringe hairs, and small anal point is present. It is also related to *E. tamaparvula* (Sasa, 1981) in that DM setae are absent, but differs essentially from the latter and also from the above species especially in the shape of dorsal appendage, being narrow, parallelsided, and with two lateral setae at about middle.

**26. *Hydrobaenus tusimolemeus* sp. nov.** (Figs. 16 a-r)

A male was collected by sweeping at Ayumodoshi on March 24. holotype: 354:16 (#6:6). BL 3.96mm, WL 2.13mm, WW/WL 0.30. Scutum and postnotum largely brown, scutellum pale, abdominal tergites and legs yellowish brown. Head in Fig. 16 a. Eyes bare, reniform and inner margin concave, ER 0.83. Antenna with 13 flagellar segments, AR 1.73, AHR 0.61, without apical seta. P/H 1.13. SO 10:10, CL 14. Anteprenotum (Fig. 16 b) united, with 3:4 lateral setae. Setae on scutum and scutellum (Fig. 16 c) relatively small in the numbers, DM 6, minute, DL 5:4, well developed, PA 4:5, SC 9.

Wing (Fig. 16 d) bluish, finely granular, squama with 20:20 fringe hairs, anal lobe nearly rectangular. Costa not extending beyond tip of R4+5. RR 0.33, VR 1.04, R/Cu 1.05. Cu2 nearly straight. Tip of front tibia (Fig. 16 e) with a long spur, tip of middle tibia (Fig. 16

f) with two short spurs, tip of hind tibia (Fig. 16 g) with a long and a short spur, and a comb composed of 10 spines separated into two equal groups (unusual character). Tips of middle and hind tarsus I (Figs. 16 h, j) each with two spurs, tips of middle and hind tarsus II (Figs. 16 i, k) each with one (Fig. 16 k) spur. Pulvilli absent. fLR 0.69, mLR 0.53, hLR 0.57, fTR 0.4, fBR 2.6, mBR 2.6, hBR 3.4.

Setae on abdominal tergites are relatively numerous, 98 on I, 122 on II, 132 on III, 104 on IV, 102 on V, 98 on VI, and 66 on VII and VIII. Hypopygium in Fig. 16 m. Anal point (also in Fig. 16 n) is unusual in shape, forming a low and long ridge situated on the midline of ninth tergite, clothed in microtrichia but without lateral setae. Virga (also in Fig. 16 p) present, composed of simple, V-shaped codes. Inner lobe of gonocoxite (also in Fig. 16 q) single, nearly rectangular, with short setae, and almost entirely covered by microtrichia. Gonostylus (also in Fig. 16 r) simple, wide, inner margin concave, without preapical tooth.

**Remarks.** This specimen is morphologically a typical member of the *Orthocladus* complex of tribe Orthocladini, and is classified into the genus *Hydrobaenus* Fries, 1830, since the general structures are *Orthocladus* form but anal point has no lateral setae. It is further quite unusual as a member of this genus in that anal point is not horn-like but is a low and long ridge situated on the midline of ninth tergite, which is a character so far observed only in *H. togatridecimus* (Sasa et Okazawa, 1992), described by two males collected at Toga (Toyama). The present specimen is closely related in structure to this species, but the latter differs from the present species in that virga is composed of some 10 codes and more complicated, inner lobe of gonocoxite is double and also more complicated in structure, and dorsolateral setae are 8 or 9 and more numerous.

**27. *Hydrobaenus tusimomeneus* sp. nov.** (Figs. 17 a-q)

A male was collected on March 24 with a light trap set in the town of Izuhara. Holotype: No. 353:66 (#4:3). BL 3.03mm, WL 1.84mm, WW/WL 0.32. Scutal stripes and postnotum dark brown, other scutal areas and scutellum yellow, legs brown, abdominal tergites I to V brown and VI to hypopygium dark brown. Head in Fig. 17 a. Eyes bare, with a wedge-shaped dorsomedial projection, ER 1.00. Antenna with 13 flagellar segments, AR 1.56, AHR 0.59. Palp short, P/H 0.92. SO 15:17, SC 15. Anteprepronotum (Fig. 17 b) united, with 1:2 lateral setae. Distribution of setae on scutum and scutellum in Fig. 17 c. DM 0 (quite unusual), DL 8:10, well developed and arising on large pale pits. PA 5:4, SC 19, in double rows, the *Euorthocladus* type.

Wing (Fig. 17 d) membrane brownish, not granular, anal lobe extended inwards. SQ 16:18 R2+3 separated, RR 0.31. VR 1.05, R/Cu 1.05. Costa not extended. Cu2 nearly straight. Tip of front tibia with a long spur, tip of middle tibia with two short spurs, tip of hind tibia with a long and a short spur, and a comb composed of 14 free spines. Tips of middle and hind tarsi I and III (Figs. 17 h, i, j, k) all with two simple preapical spurs. fLR 0.76, mLR 0.57, hLR 0.63, fTR 0.15, fBR 2.7, mBR 3.7, hBR 4.1. Pulvilli absent.

Abdominal tergites with very many setae, almost evenly distributed, 100 on I, 80 on II, 84 on III, 92 on IV, 64 on V and VI, 56 on VII, and 48 on VIII. Hypopygium in Fig. 17 m. Anal point (also in Fig. 17 n) is represented by a long and low ridge extending much beyond



posterior margin of ninth tergite, quite an unusual structure. Virga (Fig. 17 p) composed of 6 long (48 microns), fine and flexible fibers. Inner lobe of gonocoxite double layered, basal lobe narrower and rounded, with short setae but inner portion without microtrichia, Gonostylus (Fig. 17 q) simple, without preapical projection.

**Remarks.** This specimen also has the general structures typical as a member of genus *Hydrobaenus*, and is especially similar to the above species, *H. tusimolemeus* sp. nov. in having an unusual type of anal point being represented by low and longitudinal ridge, but is considered as representing a different new species since the anal point is situated far beyond posterior margin of ninth tergite and much longer, DM setae are absent, and virga is not a V-shaped stout codes but is composed of six very fine and long fibers.

**28. *Hydrobaenus tusimolemeus* sp. nov.** (Figs. 16 a-n)

Two males were collected by sweeping at Noubu on March 25. Holotype: No. 355:37 (#14:4). Paratype: 355:03 (#11:13). BL 4.66, 4.08mm, WL 2.74, 2.32mm, WW/WL 0.32, 0.32. Scutum, scutellum and postnotum black, legs and abdomen dark brown. Head in Fig. 18 a. Eyes bare, each with a wedge-shaped dorsomedial extension, ER 0.80, 0.82. Antenna with 13 flagellar segments, AR 2.32, 1.95, AHR 0.65, 0.66, without preapical seta. SO 16:16, 14:14, CL 20, 16. Anteprenotum (Fig. 18 b) united, with 6:7, 4:4 lateral setae. Setae on scutum and scutellum in Fig. 18 c, DM 12, 12, DL 12:12, 8:8, PA 6:6, 4:4, SC 16, 18.

Wing (Fig. 18 d) bare, brownish, squama with 28:28, 18:18 fringe hairs, anal lobe strongly produced inwards. Costa not extending beyond tip of R4+5. RR 0.40, 0.35, VR 1.11, 1.06, R/Cu 1.08, 1.08. Cu2 nearly straight. fLR 0.78, 0.78, mLR 0.55, 0.58, hLR 0.60, 0.64, fTR 0.13, 0.15, fBR 2.1, 2.5, mBR 2.3, 3.1, hBR 3.7, 3.9. Pulvilli absent. Terminal structure of tibiae as usual, tip of front tibia (Fig. 18 e) with one long spur, tip of middle tibia (Fig. 18 f) with two short spurs, tip of hind tibia (Fig. 18 g) with a long and a short spur, and a comb composed of 12 free spines. Tips of middle tarsi I, II and hind tarsus I with two terminal spurs (Figs. 18 h, i, j), other tarsi without terminal spur.

Abdominal tergites with large numbers of setae, 166 on I, II and III, 146 on IV, 141 on V, 134 on VI, 108 on VII, and 104 on VIII. Hypopygium in Fig. 18 k. Anal point absent, virga (also in Fig. 18 m) composed of 10 short codes situated on a cup, the lateral codes very stout. Inner lobe of gonocoxite (Fig. 18 n) double layered, dorsal lobe rounded, bearing 11 marginal setae, and free from microtrichia except for the basal portion. Gonostylus simple, inner margin slightly concave, without preapical tooth.

**Remarks.** These specimens are considered as belonging to the genus *Hydrobaenus* Fries, 1830, since the basic structures are the same as those of genus *Orthocladus* but anal point is absent. A comprehensive review of this genus was made by Saether (1976, p. 54), and also by Cranston *et. al* (1989, p. 204), and the present species is closest to the *lapponicus* group, but differs from the known species of this group in that anal point is completely absent, and inner lobe of gonocoxite is very large and double layered. According to the key to species of *Hydrobaenus* prepared by Sasa (1998, p. 82), this species is classified into the *kurobespeciosus* group, since DL setae are well developed, R/Cu >1.0, gonocoxite with one overlapping inner lobe, and middle and hind tibiae with two terminal spurs, as usual. It fur-

ther falls into *H. morigrandis* Sasa, 1992, recorded with a single male collected in a park in Morioka (Iwate), since anal point is absent, ninth tergite without setae in the middle portion, tarsi I and II of middle leg and tarsus I of hind leg with two terminal spurs and other tarsi without terminal spur, and AR is about 2.0. However, *H. morigrandis* is quite different in the structure of inner lobe of gonocoxite, the dorsal lobe acutely angulate and extending much beyond inner margin of the ventral lobe, and also in the peculiar structure of virga, being composed of 10 codes situated on a cup.

**29. *Orthocladius (Euorthocladius) frigidus* (Zetterstedt, 1852)**

Five males were collected. No. 355:38 (#14:5), 355:37 (#14:4), 355:03 (#11:13), 355:76 (#16:8), 355:55 (#15:10). BL 4.08-4.94mm, WL 2.33-2.70mm, WW/WL 0.28-0.32 (0.30)). Eyes bare, ER 0.80-0.93. Antenna with 13 flagellar segments, 195-243, AHR 0.61-0.66. SO 8-16, CL 16-22. Anteprenotum united, with 4-7 lateral setae. DM 10-16, DL 7-12, PA 3-6, SC 16-18. fLR 0.77-0.81, mLR 0.54-0.58, hLR 0.60-0.64, fTR 0.13-0.15, fBR 2.1-3.6, hBR 3.0-3.9. Pulvilli absent. Anal point stout and apically rounded, typical as an *Euorthocladius* species. Virga present, composed of 4 codes situated on a rounded cup, 34 microns long. Inner lobe of gonocoxite double layered, dorsal lobe longer than wide and rounded, without microtrichia and with short setae, ventral lobe broader and rounded, entirely clothed in microtrichia. Gonostylus with strongly concave inner margin, without preapical tooth.

**Remarks.** This is a cosmopolitan species and collected also from Hokkaido and Toyama, Japan, and is characterised by that anal point is apically rounded and with lateral setae, scutellum with 12 or more setae, DM present, AR about 2.0 or higher, and gonostylus with strongly concave inner margin.

**30. *Orthocladius (Euorthocladius) tusimoopeus* sp. nov.** (Figs. 19 a-r)

Two males were collected by sweeping in the town of Izuhara on March 24. No. 354:83 (#9:3), 354:84 (#9:4). BL 3.54, 3.06mm, WL 2.08, 1.79mm, WW/WL 0.32, 0.31. Scutum and postnotum black, scutellum, legs and abdomen dark brown. Head in Fig. 19 a. Eyes bare, reniform, ER 0.95, 1.09. Antenna with 13 flagellar segments, AR 1.60, 1.30, AHR 0.59, 0.56. P/H 1.08, 1.11. SO 16:16, 16:16, CL 10, 14. Anteprenotum (Fig. 19 b) united, with 4:4, 2:2 lateral setae. Scutum and scutellum in Fig. 19 c. DM both 0, DL 8:8, 9:9, PA all 5, SC 24, 16, in multiple transverse rows.

Wing membrane bare, brownish and smooth, venation in Fig. 19 d. SQ 22:22, 22:24, RR 36, 33, VR 1.10, 1.08, R/Cu 1.07, 1.06. Costa not extended, Cu2 nearly straight. Anal lobe strongly produced inwards. Tip of front tibia (Fig. 19 e) with a long spur, tip of middle tibia (Fig. 19 f) with two short spurs, tip of hind tibia (Figs 19 g, h) with a long and a short spur, and a comb composed of 12 free spines. Tips of middle tarsi I and II and hind tarsus I (Figs. 19 i,j,k) with two spurs, in the holotype tips of both hind tarsi II (Fig. 19 m) with only one spur, in the paratype tip of one hind tarsus II with one, and the other hind tarsus II with two spurs. fLR 0.78, mLR 0.52, 0.54, hLR 0.59, 0.60, fTR 0.16, fBR 2.1, mBR 3.5, 3.1, hBR 3.9, 5.4. Pulvilli absent.

Abdominal tergites with very many setae, 93 on I, 100 on II, 116 on III, 89 on IV, 76 on V and VI, 44 on VII, and 40 on VIII. Hypopygium in Fig. 19 n. Anal point (also in Fig. 19

p) widest at base and gradually tapering towards apex but still rather stout and apically rounded, with 16 lateral setae and microtrichia on basa 2/3. Virga (Fig. 19 q) composed of 6 simple codes. Inner lobes of gonocoxite (Fig. 19 p) double layered, the ventral lobe rectangular and clothed in microtrichia and with short setae, the dorsal free from microtrichia except and the base and with short setae. Gonostylus (Fig. 19 r) nearly straight, inner margin slightly convex, with a small, rounded preapical tooth.

**Remarks.** These specimens obviously belong to the subgenus *Euorthocladius* Thienemann, 1935, since the basic structures are the *Orthocladius* type and anal point is apically rounded and scutum with 16 or 24 setae in multiple rows. In the key to Japanese species of this subgenus compiled by Sasa and Kikuchi (1995, p. 168), it comes out to *O. asamadentalis* Sasa et Hirabayashi, 1993 in measurement data, DM being 0, and tip of hind tibia without short spur, but they differ from it in that hind tibial comb is composed of 12 spines, while they are only 5 in *O. asamadentalis*.

### 31. *Orthocladius (Orthocladius) makabensis* Sasa, 1979 (Figs. 20 a-p)

Seven males were collected. No. 353:53 (#3:5); 353:65 (#4:2); 354:40, 41 (#7:9, 10); 354:85 (#9:5); 355:75 (#16:7); 356:25 (3:5:2). BL 3.33-4.36 (3.65 in average of 7)mm, WL 1.90-2.64 (2.18)mm, WW/WL 0.30-0.32 (0.31). Scutum and postnotum dark brown, scutellum, legs and abdomen brown. Head in Fig. 20 a. Eyes bare, inner margin concave, ER 0.75-0.90 (0.81). Antenna with 13 flagellar segments, AR 1.39-1.90 (1.60), AHR 0.54-0.65 (0.60), without apical seta. P/H 0.92-1.00 (0.96). SO 8-14 (11.9), CL 7-16 (10.4). Anteprepronotum (Fig. 20 b) united, with 1, 2 or 4 (mean 2.0) lateral setae. Setae on scutum and scutellum in Fig. 20 c. DM 6-24 (14.0), all minute. DL 7-14 (10.4), all well developed and arising from large pale pits. PA 3 or 4 (3.7). SC 6-11 (8.1), small in the numbers.

Wing in Fig. 20 d. SQ 14-27 (18.2), RR 0.29-0.42 (0.36), VR 1.08-1.14 (1.11), R/Cu 1.06-1.12 (1.09). Wing membrane bluish, finely granular, Cu2 nearly straight, anal lobe slightly extended inwards, costa not extended beyond tip of R4+5. Tip of front tibia (Fig. 20 e) with a long spur, tip of middle tibia (Fig. 20 f) with two short spurs, tip of hind tibia (Fig. 20 g) with a long and a short spur, and a comb composed of 12 free spines, Tip of middle tarsus I with 2 or 3 (Fig. 20 h; in one case, No. 353:65) spurs, tip of middle tarsus II with 2 or 1 (Fig. 20 i) spur, tip of hind tarsus I (Fig. 20 j) with 1 spur.

Abdominal tergites with relatively small numbers of setae, 50 on I to V, and 46 on VI to VIII in No. 353:53. Hypopygium in Fig. 20 k, typical as a member of the *glabripennis* group of subgenus *Orthocladius*. Anal point (Fig. 20 m) widest at base and tapering towards pointed apex, with lateral setae and microtrichia on the basal portion. virga (Fig. 20 n) composed of 6 codes 30 microns long on a cup. Inner lobe of gonocoxite (Fig. 20 p) double-layered. In addition, gonocoxite has a basal process bearing strong spines. Gonostylus with concave inner margin and without preapical tooth.

**Remarks.** These specimens are provisionally classified in *O. makabensis* Sasa, 1979, which belongs to the *glabripennis* group but wings, legs and AR are smaller than in the type specimens.

### 32. *Orthocladius (Orthocladius) tusimopequeus* sp. nov. (Figs. 21 a-n)

Two specimens were collected. Holotype: No. 356:25 (#3:5:2). Paratype: No.353:96 (#5:15). BL 3.12, 3.82mm, WL1.86, 2.05mm, WW/WL 0.30, 0.31. Scutal stripes and postnotum dark brown, other scutal areas and scutellum yellow, legs and abdomen brown. Head in Fig. 21 a. Eyes bare, with a wedge-shaped dorsomedial projection, ER 0.63, 0.74. Antenna with 13 flagellar segments, AR 1.30, AHR 0.56 (antenna of paratype damaged). P/H 0.97, 0.76, SO 10:10, 12:14, CL 5, 6. Anteprenotum (Fig. 21 b) narrowly united, with 2:2, 2:2 lateral setae. Setae on scutum and scutellum in Fig. 21 c; DM 14, 18, all minute, DL 16:16, 15:17, also all minute, decumbent and arising on small pits, like in those of *Cricotopus*. PA all 4, SC both 8.

Wing (Fig. 21 d) bare, plain, squama with 17:19, 15:14 fringe hairs, anal lobe slightly produced, venation typical as a member of *Orthocladius*, i.e. costa not extended beyond tip of R4+5, Cu2 nearly straight, RR 0.37, 0.40, VR 1.11, 1.08, R/Cu 1.07, 1.08. Tip of front tibia (Fig. 21 e) with a long spur, tip of middle tibia (Fig. 21 f) with two short spurs, tip of hind tibia (Fig. 21 g) with a long, and a short spur, and a comb composed of 10 simple spines. Tips of middle tarsus I and II (Figs. 21 h,i) each with two terminal spurs in both specimens, tip of one of the tarsus I of hind tibia of the paratype with one terminal spur, the other tarsi of both specimens without terminal spur. fLR 0.74, 0.74, mLR 0.55, 0.55, hLR 0.62, 0.63, fTR 0.13, 0.13, fBR 2.8, 1.9, mBR 3.6, 2.4. Pulvilli absent.

Abdominal tergites (Fig. 21 k, right half) with relatively small numbers of setae as a member of this genus, 38 on I, 42 on II, 40 on III and IV, 36 on V, and 32 on VI to VIII. Hypopygium in Figs. 21 m, n. Anal point long, narrow, tapering towards pointed apex, situated on a broad base, with lateral and basal setae, basal portion clothed in microtrichia. Virga (Fig. 21 n) composed of U-shaped codes situated on a cup. Inner lobes of gonocoxite (Fig. 21 n) double layered, with numerous short setae. Gonostylus simple, long and narrow, without preapical tooth.

**Remarks.** These specimens show basic structures typical as a member of subgenus *Orthocladius* s. str., but belongs to an unusual group with dorsolateral setae minute, decumbent and arising on small pits, like in those of the genus *Cricotopus*. Two species have been recently recorded from Japan as members of this group, *O. biwainfirmus* Sasa et Nishino, 1995, collected in winter from Lake Biwa (Shiga), and *O. toyamakeleus* Sasa, 1996, recorded from a lake in Toyama in November and December, both differing from the present species, the former with 3 peculiar inner lobes on gonocoxite, and the latter without dorsomedian setae on scutum and without virga.

### 33. *Psectrocladius* (*Monopsectrocladius*) *tusimoquereus* sp. nov. (Figs. 22 a-k)

Three males were collected by sweeping. Holotype: No. 354: 17 (#6:7). Paratype: No. 359:43 (#7:12), 355:02 (#11:12). BL 3.64, 3.26, 3.42mm, WL 1.82, 1.78, 1.96mm, WW/WL 0.27, 0.29, 0.30. Scutal stripes and postnotum black, humeral areas of scutum, scutellum, legs and abdomen brown. Head in Fig. 22 a. Eyes bare, each with a wedge-shaped dorsomedial projection, ER 0.90, 0.94, 0.84. Antenna with 13 flagellar segments, without apical seta, AR 1.76, 1.59, 1.82, AHR 0.63, 0.61, 0.63. P/H 1.00, 1.09, 1.03. SO 6+6:6+6, 3+6:3+5, 6+5:7+6, CL 5, 6, 7. Anteprenotum (Fig. 22 b) united, with 4:4, 3:3, 6:6 lateral setae. Setae

on scutum and scutellum in Fig. 22 c. DM 16, 16, 20, all minute. DL 18:17, 16:16, 20:24, all well developed and arising on large pale pits. PA 11:12, 8:8, 15:16 (relatively large), SC 16, 12, 18.

Wing (Fig. 22 d) bare but membrane bluish and granular, like in that of the genus *Limnophyes*. SQ 9:10, 10:10, 14:16, RR 0.48, 0.40, 0.43, VR 1.13, 1.17, 1.12, R/Cu 1.07, 1.11, 1.08. Cu2 slightly curved near tip. Anal lobe obtuse. Tip of front tibia (Fig. 22 e) with a long spur, tip of middle tibia (Fig. 22 f) with two short spurs (a character separating *Monopsectrocladius* from *Psectrocladius* s. str.), tip of hind tibia (Fig. 22 g) with a long and a short spur, and a comb composed of 12 free spines. Tarsi without prepaical spurs. All legs with large brush-like pulvilli (Fig. 22 h, hind tarsus V). fLR 0.67, 0.67, 0.64, mLR 0.47, 0.43, 0.44, hLR 0.59, 0.55, 0.57, fTR 0.13, 0.12, 0.11, fBR 2.4, 2.6, 1.5, mBR 2.6, 2.7, 1.5, hBR 2.9, 3.4, 2.8.

Setae on abdominal tergites (Fig. 22 i) are 48 on I, 56 on III, 72 on III and IV, 80 on V to VII, and 56 on VIII in the holotype. Hypopygium in Fig. 22 j, and enlarged figures of virga (Vi), anal point (AP), posterior margin of ninth tergite (9th), inner lobes of gonocoxite, and left gonostylus in Fig. 22 k. Gonostylus simple, inner margin nearly straight, and with 4 unusually long setae on inner margin.

**Remarks.** These specimens belong to the genus *Psectrocladius* Kieffer, 1906, since the basic structure is the *Orthocladius* type and legs with large pulvilli, and further to the subgenus *Monopsectrocladius* Wuelker, 1956, since tip of middle tibia with two terminal spurs. In the European species of this subgenus, *P. calcaratus* (Edwards, 1929), anal point is much longer and narrower, and AR is larger (about 2.0 after Edwards, 1929), and tarsi with long beards. Among the 4 species of this subgenus recorded from Japan, this species is most closely related to *P. fujigaprimus* Sasa, 1994, in the absence of spurs on tarsi, and in the shape of anal point and inner lobe of gonocoxite, but it differs also from the present species in that AR is smaller (1.00-1.14), ER larger, anteprenotum separated, DL 7-11 and smaller, base of anal point much smaller, virga absent, and gonostylus is strongly expanded in the middle. Wing membrane of the present species is granular and bluish, and costa is extended beyond tip of R4+5 like in that of genus *Limnophyes* Eaton, but in the latter Cu2 is strongly curved, and squama with only a few fringe hairs.

#### 34. *Psectrocladius* (*Psectrocladius*) *tusimoreseus* sp. nov. (Figs. 23 a-r)

Two males were collected by sweeping at Uchiyama on March 24. Holotype: No. 353:99 (#5:18). Paratype: No. 353:97 (#6:16). BL 3.46, 3.66mm, WL 1.70, 1.82mm, WW/WL 0.32, 0.33. Scutal stripes and postnotum black, humeral areas and prescutellar areas pale, scutellum, legs and abdomen brownish yellow. Head in Fig. 23 a. Eyes bare, oval and inner margin convex, ER 1.43, 1.31. Antenna with 13 flagellar segments, AR 1.43, 1.31, AHR 0.58, 0.56, apical seta absent. P/H 1.11, 1.08. Sopraorbital setae composed of 1 inner and 5 lateral groups in both specimens. CL 8, 12. Anteprenotum (Fig. 23 b) united, with 1 lateral seta. Setae on scutum and scutellum in Fig. 23 c; DM both 0, DL 12:10, 12:12, all well developed. PA all 3, SC 6,8.

Wing (Fig. 23 d) bare, brownish and smooth, squama with 24:23, 31:26 fringe hairs, anal lobe nearly rectangular. R2+3 separated, RR 0.37, 0.34. VR 1.26, 1.22, R/Cu 1.08, 1.09.

Costa not extended, Cu2 nearly straight. Tip of front tibia (Fig. 23 e) with a long spur, tip of middle (Fig. 23 f) tibia with only one spur, tip of hind tibia (Figs. 23 g,h) with a long and a short spur, and a comb composed of 14 free spines. Tips of middle tarsi I, II and III (Figs. 23 i,j,k) each with 2 terminal spurs, tip of hind tarsus I (Fig. 23 m) with 2, and tip of hind tarsus II (Fig. 23 n) with 1 terminal spur. All legs with a pair of large pad-like pulvilli (Fig. 23 p, front tarsus V).

Setae on abdominal tergites are relatively numerous, and distributed almost evenly. Hypopygium in Fig. 23 q. Anal point (also in Fig. 23 r) composed of a rectangular base clothed in microtrichia, and a short, bare distal horn. Virga absent in both specimens. Inner lobe of gonocoxite (Fig. 23 s) broad and obtuse, with short setae and microtrichia on the distal half. Gonostylus (Fig. 23 t) simple, without preapical tooth.

**Remarks.** These specimens belong to the genus *Psectrocladius* Kieffer, 1906, since the basic structure is the *Orthocladius* form, and with well developed pad-like pulvilli. They further belong to the subgenus *Psectrocladius* s. str., since middle tibia with only one terminal spur. They are somewhat related in the shape of anal point and inner lobe of gonocoxite to *P. barbimanus* Edwards among the European species, but the latter differs from the present species in that AR is larger than 2.0 and anterior tarsi with long beards. They are also somewhat related among the Japanese species to *P. aquatronus* Sasa, 1979 and *P. yunoquartus* Sasa, 1984, but both differ from the present species in that AR is 1.7 or larger, anal point is apically pointed and largely bare, and tarsus III of middle leg without terminal spur.

### 35. *Psectrocladius* (*Psectrocladius*) *tusimoseteus* sp. nov. (Figs. 24 a-t)

A male was collected on March 24 by sweeping at Uchiyama. Holotype: No. 357:29 (#5:16:2). BL 3.18mm, WL 1.84mm, WW/WL 0.34. Scutal stripes and postnotum black, other humeral and prescutellar areas pale, scutellum, legs and abdomen brown. Head in Fig. 24 a. Eyes reniform, inner margin slightly concave, ER 1.12. Antenna with 13 flagellar segments, AR 1.40, AHR 0.60, apical seta absent. Palp long, P/H 1.14. SO 1+6:1+6, CL 10. Antepronotum (Fig. 24 b) united, with 2:2 lateral setae. Distribution of setae on scutum and scutellum in Fig. 24 c; DM 0, DL 12;13, PA 3:3, SC 4.

Wing (Fig. 24 d) bare, brownish, not granular. SQ 21:21, anal lobe nearly rectangular. RR 0.39, VR 1.25, R/Cu 1.06. Costa slightly extended beyond tip of R4+5. Cu2 nearly straight. fLR 0.71, mLR 0.47, hLR 0.49, fTR 0.13, fBR 1.9, mBR 3.3, hBR 5.0. Tip of front tibia (Fig. 24 e) with a long spur, tip of middle tibia (Fig. 24 f) with only one terminal spur, tip of hind tibia (Figs. 24 g,h) with a long spur but without short spur, and a comb composed of 12 simple spines. Tips of middle tarsi I, II and III (Figs. 24 i,j,k) each with two terminal spurs, tips of hind tarsi I, II and III (Figs. 24 m,n,p) each with one terminal spur. All legs with a pair of large brush-like pulvilli (Fig. 24 q, hind tarsus V).

Setae on abdominal tergites are 50 on I, 64 on II, 58 on III, 52 on IV, 44 on V and VI, and 32 on VII and VIII. Hypopygium in Figs. 24 r,s. Anal point widest at base, much longer than wide and apically rounded, clothed in microtrichia except on the distal portion, with 3 lateral setae on both sides. Virga absent. Inner lobe of gonocoxite (Fig. 24 s) double layered, basal portion largely free from microtrichia and with short setae, distal lobe thickly covered

by microtrichia. Gonostylus (Fig. 24 t) simple, inner margin nearly straight, without preapical tooth.

**Remarks.** These specimens has the characters typical as a member of genus *Psectrocladius* Kieffer, since the structures of head, wings, and hypopygium are the *Orthocladius* type but all legs with large brush-like pulvilli. It further belongs to the subgenus *Psectrocladius*, since middle tibia with only one terminal spur. It is most closely related to *P. fennicus* Stora in the shape of inner lobe of gonocoxite and gonostylus, but the shape of anal point is quite different (cf. Pinder, 1978, Fig. 116D). The present species is also somewhat related among the Japanese species of this group to the common species, *P. aquatronus* Sasa, 1979, and *P. yunoquartus* Sasa, 1984, but again differs from them in that AR is smaller (1.7-2.1 in both species), tarsi I and II of middle and hind legs with two terminal spurs but tarsi III without terminal spur, and differs also in the shape of anal point.

### Tribe Metriocnemini

#### 36. *Heterotrissocladius* sp. *tusimoteuus*. (Figs. 25 a-i)

A male was collected by sweeping at Azugawa on March 23. No. 356:04 (#1:17:3). BL 2.36mm, WL 1.87mm, WW/WL 0.28. Scutal stripes and postnotum dark brown, other scutal portions and scutellum pale, abdomen and legs brown. Head in Fig. 25 a Eyes bare, reniform, ER 1.41. Antenna with 13 flagellar segments, AR 0.88, AHR 0.49. SO 1+3:1+3, CL 6. Antepronotum (Fig. 25 b) narrowly united, PN 1:0. Scutum and scutellum in Fig. 25 c, DM 0, DL 5:5, PA 4:3, SC 4.

Wing (Fig. 25 d) bare, with macrotrichia on entire surface. SQ 4:5, anal lobe nearly flat. R2+3 in contact with R4+5. VR 1.46, R/Cu 1.07. Cu2 nearly straight. Tip of front tibia (Fig. 25 e) with a long (43 microns) spur, tip of middle tibia (Fig. 25 f) with two short spurs (20 and 21 microns), tip of hind tibia (Figs. 25 g, h) with a long (48 microns) and a short (21 microns) spur, and a comb composed of 14 free spines. Tarsi without terminal spurs. Pulvilli absent. fLR 0.59, mLR 0.48, hLR 0.53, fTR 0.15, fBR 2.4, mBR 2.6, hBR 2.9.

Abdominal tergites with small number of setae, 10 on I, 8 on II and III, 10 on IV, 14 on V, 10 on VI and VII, and 8 on VIII. Hypopygium in Fig. 25 i. Anal point widest at base and gradually tapering towards pointed apex, distal 2/3 bare and hyaline. Virga absent. Inner lobe of gonocoxite produced posteriorly like a finger. Gonostylus simple, widest near apex and inner margin concave, without preapical tooth.

**Remarks.** The wings of this specimen bear macrotrichia on entire surface, squama fringed, costa not extended, R/Cu >1.0, and Cu 2 is nearly straight, and thus its structure is typical as a member of genus *Heterotrissocladius* Sparck, 1923. However, the body length is only 1.87mm and thus there exist some doubt that body of a different specimen might have been mounted on the same slide by mistake. Therefore, the species diagnosis is reserved until additional specimens be collected.

#### 37. *Limnophyes minimus* (Meigen, 1818)

Twenty (20) males collected on Tsushima are identified as this species. No. 353:33, 34 (#1:31, 32), 354:04-06 (#5:23,24), 354:23, 25 (#6:13:1,3), 355:442 (#14:9), 355:83 (#16:14),

355:92 (#17:8), 356:10,12,13 (#1:31:2, 32:2,3), 356:45 (6:13:4), 371:70 (#11:21:2), 372:27 (#1:11:2), 372:42-45 (2:16:2-5). This is one of the species distributed commonly in the Holarctic Region.

### 38. *Limnophyes oyabehiematus* Sasa, Kawai et Ueno, 1988

Twenty seven (27) males were collected and identified. No. 353:30-32 (#1:29, 30, 33), 354:19, 24 (#6:9,13), 354:45 (#7:14), 354:78 (#8:15), 354:100 (#11:10), 355:12 (#11:22), 355:29,30 (#13:5,6), 355:56 (#15:11), 355:60,61 (#15:15,16), 355:80 (#16:11), 356:08,09,11 (#1:29,30,31), 356:47,48 (#7:14:2,3), 356:63-65 (13:6:2-4), 371:61,62 (#8:15:2,3), 372:36,37 (#2:7:5,6). This species was recorded at 3 localities in Toyama, and this is the first record outside of this prefecture.

### 39. *Metriocnemus tusimouveus* sp. nov. (Figs. 27 a-k)

Four males were collected by sweeping at 4 different localities on Tsushima. Holotype: No. 354:87 (#9:7). Paratypes: No.354:73 (#8:10), 355:13 (#11:23), 355:32 (#13:8). BL 2.06-2.72 (2.35 in average of 4)mm, WL 1.26-1.53 (1.35)mm, WW/WL 0.30-0.34 (0.32). Scutal stripes and postnotum brown, other scutal portions and scutellum yellow, legs and abdominal tergites brownish yellow. Head in Fig. 27 a. Eyes bare, inner margin strongly concave, ER 0.56-0.85 (0.72). Antenna with 13 flagellar segments, AR 0.54, 0.50, 0.47, 0.46 (mean, 0.49), AHR 0.34-0.47 (0.40). P/H 0.98-1.20 (1.08). SO 8-12 (10.0), CL all 8. Anteprenotum (Fig. 27 b) narrowly united, with 2, 4, or 5 (3.1) lateral setae. Distribution of setae on scutum and scutellum in Fig. 27 c. DM 14-24 (18.0), DL 13-26 (18.4), PA 6-8 (7.1), SC 6-8 (7.5).

Wing (Fig. 27 d) clothed with macrotrichia on almost entire surface, squama with 4-6 (5.5) fringe hairs, anal lobe obtuse. R2+3 in contact with R4+5, VR 1.13-1.20 (1.16), R/Cu 0.90-0.94 (0.92). Costa extending much beyond tip of R4+5. Tip of front tibia (Fig. 27 e) with a long spur, tip of middle tibia (Fig. 27 f) with two short spurs, tip of hind tibia (Fig. 27 g) with a long, and a short spur, and a comb composed of 16 free spines. fLR 0.63-0.67 (0.65), mLR 0.49-0.51 (0.50), hLR 0.63-0.65 (0.46), fTR 0.14-0.15, fBR 2.0-3.2 (2.8), mBR 2.9-4.3 (3.8), hBR 3.8-4.9 (4.5)). Tips of tarsi I and II of middle and hind legs without spurs. Pulvilli absent.

Setae on abdominal tergites (Fig. 27 h) in the holotype are 20 on I, 26 on II to IV, 32 on V, 40 on VI and VII, and 44 on VIII. Hypopygium in Fig. 27 i. Anal point large, conical, widest at base and smoothly tapering towards apex, with microtrichia and some 6 lateral setae on basal 2/3, apical 1/3 bare. Inner lobe of gonocoxite (Figs. 27 j, dorsal; k, ventral view) double layered, dorsal lobe acutely angulate, ventral lobe broader and roughly rectangular, both with short setae and microtrichia. Gonostylus simple, widest at about distal 2/3, with a small acute angular preapical tooth.

**Remarks.** These specimens are typical members of the genus *Metriocnemus* van der Wulp, 1874, since eyes are bare, wing with macrotrichia, squama fringed, costa extended, and Cu2 is nearly straight. They are very close to *M. ryutanus* Sasa et Hasegawa, 1988, recorded first at the side of Lake Ryutan, Okinawa, and later also in the valley of Toga (Toyama), since anal point is robust and long, ER is about 0.5 and small, scutellum with only 8 setae, tip of R4+5 is much proximal to tip of Cul and R/Cu <1.0, tarsi without terminal



spurs, but are described as a new species, because AR is much smaller (0.94 in the type specimen of *M. ryutanus*), R2+3 is in contact with R4+5 (RR 0.56 in *M. ryutanus*), anal point is smoothly tapering towards apex (abruptly constricted at distal 1/3 and the apical portion is bare and parallel-sided, with rounded apex in *M. ryutanus*), and inner lobe of gonocoxite is double layered and dorsal lobe acutely angulate (single layered and obtuse in *M. ryutanus*).

**40. *Metriocnemus tusimoveueus* sp. nov.** (Figs. 28 a-k)

Two males were collected by sweeping on March 25. Holotype: No. 355:27 (#13:3). Paratype: No. 355:28 (#13:4). Seutum, scutellum and postnotum largely black, humeral areas pale, abdominal tergites and legs largely dark brown. Head in Fig. 28 a. Eyes bare, each with a wedge-shaped dorsomedial extension, ER 0.63, 0.72. Antenna with 13 flagellar segments, AR 1.23, 1.04, AHR 0.62, 0.51. P/H 1.02, 0.94. SO 12:12, 12:12, CL 8, 10. Anteprenotum (Fig. 28 b) united, with 6:6, 5:5 lateral setae. Distribution of setae on scutum and scutellum in Fig. 28 c; DM 16, 20, all minute; DL 20:20, 28:28, all arising on large pale pits; PA 6:6, 10:8; SC 8, 10.

Wing (Fig. 28 d) clothed with macrotrichia mainly in the distal half and posterior portions, squama with 8:8, 6:5 fringe hairs, anal lobe obtuse. Costa extending slightly beyond tip of R4+5. R2+3 in contact with R4+5. VR 1.13, 1.12, R/Cu 0.95, 0.88. Cu2 nearly straight. Tip of front tibia (Fig. 28 e) with a long spur, tip of middle tibia (Fig. 28 f) with two short spurs, tip of hind tibia (Fig. 28 g) with a long and a short spur, and a comb composed of 12 free spines. Tarsi without terminal spurs. fLR 0.70, 0.73, mLR 0.54, 0.54, hLR 0.68, 0.69, fTR 0.14, 0.13, fBR 2.6, 2.8, mBR 3.5, 3.3, hBR 4.6, 3.8. Pulvilli absent.

Distribution of setae on abdominal tergites in Fig. 28 h (right half), the numbers are 38 on I, 62 on II to VI, 60 on VII, and 54 on VIII. Hypopygium in Fig. 28 i. Anal point (also in Fig. 28 j) rather small, semicircular, situated in the middle of ninth tergite and entirely clothed with short setae and microtrichia. Inner lobe of gonocoxite (Fig. 28 k) double layered, the dorsal lobe narrower and rounded, with short setae but without microtrichia except in the basal portion, the ventral lobe obtuse and entirely clothed with microtrichia. Gonostylus (Fig. 28 k) widest near apex, with a prominent rectangular preapical tooth.

**Remarks.** These specimens also belong to the genus *Metriocnemus*, and is most closely related among the previously known species of this genus to *M. togamirus* Sasa, Watanabe et Arakawa, 1992, in that anal point is small and low, and tarsi I and II of middle and hind legs without apical spur, but the latter differs from the present species in that AR is 1.39 and larger, tip of R4+5 is distal to tip of Cul and R/Cu 1.06-1.08, anal point is not rounded but rectangular and situated on posterior margin of ninth tergite, and gonostylus is more slender and without preapical tooth.

**41. *Parakiefferiella tusimowexeus* sp. nov.** (Figs. 29 a-i)

A male was collected. Holotype: No. 371:88 (#18:9:4). BL 2.48mm, WL 1.59mm, WW/WL 0.33. Scutal stripes, scutellum and postnotum dark brown, legs and abdominal tergites yellowish brown. Head in Fig. 29 a. Eyes bare, reniform, ER 1.41. Antenna with 13 flagellar segments, AR 0.82, AHR 0.40. P/H 0.83. SO 4:4, SC 7. Anteprenotum (Fig. 29 b) united, with 1:1 lateral seta. Setae on scutum and scutellum in Fig. 29 c. DM 0, scutum with a small

rounded hole bearing microtrichia in the center. DL 4:5, PA 3:3, SC only 2.

Wing (Fig. 29 d) bare, brownish, smooth, squama bare, anal lobe obtuse. Costa extended beyond tip of R4+5, which is proximal to tip of Cul, R/Cu 0.97. RR 0.56, VR 1.17. Tip of front tibia (Fig. 29 e) with a long spur, tip of middle tibia (Fig. 29 f) with two short spurs, tip of hind tibia (Fig. 29 g) with a long and a short spur, and a comb composed of 12 free spines. fLR 0.57, mLR 0.49, hLR 0.52, fTR 0.12, fBR 2.8, mBR 2.8, hBR 4.9. Pulvilli absent.

Setae on abdominal tergites (Fig. 29 h) relatively small in numbers, 20 on I and II, 22 on III and IV, 24 on V and VI, and 20 on VII and VIII. Hypopygium in Fig. 29 i. Anal point absent, but ninth tergite with a broad and rounded lobe along posterior margin, bearing 8 short setae. Virga conspicuous, composed of 4 codes 38 microns long. Inner lobe of gonocoxite double layered, rectangular, with short setae on the basal lobe and microtrichia mainly on the distal lobe. Gonostylus simple, straight, without preapical tooth.

**Remarks.** This species is a member of the *Smittia* complex of subfamily Orthocladinae, since eyes are bare, wing membrane bare and smooth, and Cu2 is strongly curved, and is considered as belonging to the genus *Parakiefferiella* Thienemann, 1936, since antenna without apical seta and AR <1.0, squama bare, R4+5 proximal to tip of Cul, and costa is extended. However, it is unusual as a member of this genus in that R2+3 is separated from R4+5 (in contact with R4+5 in most species), and anal point is absent. It is therefore most closely related to *P. kurobeminuta* Sasa et Okazawa, 1992 recorded from Toyama, but the present species is larger in AR (0.3-0.38 in *P. kurobeminuta*), and inner lobe of gonocoxite has a bare, finger-like process along inner margin in the latter.

#### 42. *Parametriocnemus stylatus* (Kieffer, 1924) (Fig. 26 a)

Seven males were collected by sweeping at 3 localities on Tsushima. No. 353:100 (#5:19), 355:51 (#15:6), 355:88 (#17:4), 356:40 (#5:19:2), 371:21, 22, 23 (#5:19:3, 4, 5). BL 3.02-3.39 (3.19 in average of 7)mm, WL 1.62-1.86 (1.75)mm, WW/WL 0.28-0.32 (0.30). Scutal stripes and postnotum brown, other body portions largely yellow. ER 0.32-0.50, AR 0.98-1.19 (1.09), AHR 0.52-0.61 (0.55), P/H 1.03-1.18 (1.09), SO 9-12 (10.9), CL 9-12 (10.3), PN 5 or 6 (5.7), DM 18-30 (25.1, all minute), DL 14-23 (15.6), PA 3-6 (4.5), SC 7-11 (8.6). Wing with macrotrichia, SQ 4-8 (6.8), RR 0.36-0.68 (0.55), VR 1.08-1.19 (1.12), R/Cu 1.02-1.04 (1.03), Cu2 strongly curved. fLR 0.73-0.76 (0.75), mLR 0.56-0.58 (0.57, very high), hLR 0.62-0.62 (0.64), fTR 0.10-0.13 (0.12), fBR 1.8-2.8 (2.3), mBR 2.7-3.8 (3.3), hBR 2.8-4.6 (3.7). Tarsi I and II of middle and hind legs without terminal spur, pulvilli absent.

Hypopygium in Fig. 26 a. Anal point composed of a large conical base entirely clothed with microtrichia and with short lateral setae, and a bare, narrow and parallel-sided distal horn. Inner lobe of gonocoxite broad and rounded. Gonostylus without preapical tooth.

**Remarks.** The above structure is almost identical to those of *stylatus* (Kieffer, 1924) described originally in Europe and recorded from a number of localities in the mainland of Japan (Sasa and Kikuchi, 1995, p. 70, 186).

#### 43. *Paraphaenocladus penerasus* (Edwards, 1929)

Two males were collected by sweeping on March 24, 2 at Ayumodoshi, No. 354:28, 29

(#6:16, 17). Scutal stripes and postnotum brown, other body portions largely yellow. BL 2.36, 2.43mm, WL 1.18, 1.36mm, WW/WL 0.34, 0.32, Eyes bare, reniform, ER 0.84, 0.68. Antenna with 13 flagellar segments, AR 0.59, 0.51, AHR 0.38, 0.34. P/H 0.87, 1.02. SO 11:11, 9:10, CL 8, 6.

Anteprenotum (Fig. 30 b) united in the middle, with 4:4, 3:3 lateral setae. Scutum and scutellum in Fig. 30 c. DM 12, 10, DL 15:15, 15:16, PA 7:6, 6:6, SC 6, 8.

Wing with macrotrichia rather sparsely on distal half and along posterior margin. Squama with 4:6, 3:3 fringe hairs. R2+3 separated, RR 0.45, 0.40. VR 1.16, 1.15. Tip of R4+5 proximal to tip of Cul, R/Cu 0.96, 0.95. Cu2 strongly curved. Tip of front tibia with a long spur, tip of middle tibia with two short spurs, tip of hind tibia with a long and a short spur, and a comb composed of 10 free spines. fLR 0.62, 0.65, mLR 0.48, 0.52, hLR 0.65, 0.65, fTR 0.14, 0.15, fBR 3.1, 3.4, mBR 3.8, 4.1, hBR 6.1, 4.8. Tips of middle and hind tarsi I and II, without terminal spurs. Pulvilli absent.

The numbers of setae on abdominal tergites are 16 on I, 28 on III, 32 on III, 28 on IV to VII, and 24 on VIII. Anal point long, widest at base and tapering towards apex, clothed with microtrichia and short lateral setae on basal 4/5, distal 1/5 bare. Inner lobe of gonocoxite single layered. Gonostylus widest near apex, and with a rectangular preapical tooth.

**Remarks.** These specimens belong to the genus *Paraphaenocladius* Thienemann, 1924, since wing with macrotrichia, vein Cu2 strongly curved, tip of R4+5 is proximal to tip of Cul, and anal point is well developed. From the above morphological characters and measurement data, they are provisionally identified as *P. penerasus* (Edwards, 1929). This species was originally described in England, and was recorded also from Lake Toya (Hokkaido) by Sasa (1988) and from Toga (Toyama) by Sasa and Okazawa (1992).

#### 44. *Paraphaenocladius tusimoxeyeus* sp. nov. (Figs. 30 a-k)

A male was collected by sweeping on March 24. Holotype: 371:52 (#7:30:3). BL 2.26 mm, WL 1.13mm, both smaller than in the above species, *P. stylatus*. WW/WL 0.32. Scutal stripes and postnotum brown, other body portions largely yellow. Head in Fig. 30 a. Eyes bare, reniform, ER 0.82 (larger). Antenna with 13 flagellar segments, AR 0.39 (smaller), AHR 0.35. SO 8:8, CL 8. Anteprenotum (Fig. 30 b) united, with 3:3 lateral setae. Distribution of setae on scutum and scutellum in Fig. 30 c; DM 16, DL 13:13, PA 7:7, SC 6.

Wing (Fig. 30 d) with macrotrichia on distal half and along posterior margin, squama with only 2:2 fringe hairs, anal lobe obtuse. Costa extended beyond tip of R4+5, which is proximal to tip of Cul, R/Cu 0.92. R2+3 almost in contact with R4+5. VR 1.09. Cu2 strongly curved at about distal 1/3. Tip of front tibia (Fig. 30 e) with a long spur, tip of middle tibia (Fig. 30 f) with two short spurs, tip of hind tibia (Fig. 30 g) a long and a short spur, and a comb composed of 10 free spines. fLR 0.63, mLR 0.50, hLR 0.65, fTR 0.15, fBR 2.9, mBR 3.6, hBR 3.9. Tips of tarsi I and II of middle and hind legs without terminal spur. Pulvilli absent.

Abdominal tergites (Fig. 30 h) with small numbers of setae, 12 in I, 24 on II, 16 on III, 30 on IV to VII, and 34 on VIII. Hypopygium in Fig. 30 i. Anal point (Fig. 30 j) robust, narrow conical and tapering towards pointed apex, with 7 lateral setae, apical 1/4 bare and

basal 3/4 clothed in microtrichia. Virga absent. Inner lobe of gonocoxite (Fig. 30 k) double layered, dorsal lobe narrower and acutely angulate. Gonostylus simple, widest near apex, with a rectangular preapical tooth.

**Remarks.** This specimen also belongs to the genus *Parametriocnemus*, and is most closely related, especially in the structure of hypopygium, to the above species, *M. stylatus*, but differs from it in that WL and AR are smaller, ER is larger, R2+3 almost in contact with R4+5. tip of R4+5 is proximal to tip of Cul, fLR and mLR is much smaller, distal bare portion of anal point is much shorter, inner lobe of gonocoxite is double, and gonostylus with an acute angulate preapical tooth.

#### 45. *Smittia aterrima* (Meigen, 1818)

A total of 14 males were identified. No. 353:57, 58 (#3:9, 13), 354:46,47 (#7:15, 16), 355:57, 58 (#15:12, 13), 355:78, 79 (#16:10, 10:3), 356:22 (#3:6:2), 371:49, 50 (#7:15:2, 3), 372:33-35 (#2:6:3, 4, 5). This is a species with cosmopolitan distribution.

#### 46. *Smittia pratora* (Goetghebuer, 1926)

A total of 16 males were identified. No. 353:29 (#1:28), 353:59 (#3:14), 354:21 (#6:11), 354:49, 50 (#7:18, 19), 355:09, 11 (#11:19, 21), 355:21 (#12:4), 355:31 (#13:7), 355:41 (#14:8), 355:59 (#15:14), 356:07 (#1:28:2), 356:49 (7:19:2), 56, 58 (#11:19:2, 19:21:2), 371:90 (#6:11:5). This is another species with a cosmopolitan distribution.

#### 47. *Smittia tusimoyezea* sp. nov. (Figs 36 a-g)

A male was collected by sweeping at Azugawa on March 24. Holotype: No. 354:76 (#8:13). BL 2.56mm, WL 1.50mm, WW/WL 0.29. Scutum, scutellum and postnotum black, legs and abdominal tergites almost uniformly dark brown. Head in Fig. 36 a. Eyes pubescent, reniform, ER 1.06. Antenna with 13 flagellar segments, with a prominent apical seta, AR 1.30, AHR 0.56. Palp short, P/H 0.79. SO 1+3:1+3, CL 10. Anteprepronotum united, with 1:1 lateral seta. DM 20, all minute, DL 12:12, all well developed, PA 4:5, SC 7 (Fig. 36 b). Wing typical as a member of genus *Smittia*. Squama bare, membrane brownish, bare, plain. Costa extended much beyond tip of R4+5, which is distal to tip of Cul, R/Cu 1.05. R2+3 separated, RR 0.45, VR 1.32. Cu2 strongly curved. Anal lobe obtuse. Tip of front tibia (Fig. 36 c) with a long spur, tip of middle tibia (Fig. 36 d) with two short spurs, tip of hind tibia (Fig. 36 e) with a long and a short spur, and a comb composed of 12 free spines. Pulvilli vestigial.

Abdominal tergites (Fig. 36 f) with relatively small numbers of setae, 36 on I, 44 on II to IV, 36 on V, 32 on VI to VIII. Hypopygium in Fig. 36 g. Anal point long, widest at base and apically rounded, darkly pigmented but without microtrichia and setae. Virga composed of two codes 24 microns long. Inner lobe of gonocoxite double layered, both with rounded margin and with microtrichia. Gonostylus with strongly expanded inner margin on entire length, with megaseta, but without preapical tooth.

**Remarks.** This specimen is a typical member of the genus *Smittia* Holmgren, since wing membrane bare and smooth, antenna with an apical seta, Cu2 strongly curved, and anal point is robust. It is further related to *S. pratora* (Goetghebuer) in that AR is smaller than 2.0, gonostylus is strongly expanded, tip of R4+5 distal to tip of Cul, and anal point is robust, but the latter is essentially different from the present species in that eyes are bare (Edwards,

1929, p. 361), anal point is long, nearly parallel-sided and basal half clothed in microtrichia, and inner lobe of gonocoxite is narrow and pointed. The shape and structure of anal point and inner lobe of gonocoxite are quite characteristic to the present species.

**48. *Toyamayusurika shiotanii* Sasa et Kawai, 1987** (Figs. 31 a-p)

Six males were collected by sweeping at Uchiyama, Tsuhima, on March 24, 1998. No. 356:31-36 (#5:17:3-8). BL 3.04-3.34 (3.21 in average of 5)mm, WL 1.59-1.70 (1.66)mm, WW/WL 0.28-0.31 (0.30). Scutum and postnotum largely black, scutellum pale, legs brown, abdominal tergites dark brown.

Head in Fig. 31 a. Eyes bare, reniform, ER 1.33-1.52 (1.27). Antenna with 13 flagellar segments, AR 1.20-1.30 (1.27), AHR 0.56-0.59 (0.57), last segment with an apical seta. Palp almost as long as the diameter of head, P/H 0.96-1.04 (1.01). SO 10-13 (mean 10.9), CL 7-12 (9.4). Anteprenotum (Fig. 31 b) united in the middle; with 10-12 (10.6) lateral setae. Distribution of setae on scutum and scutellum in Fig. 31 c. DM 16-22 (17.2), all minute; DL 24-32 (28.0), PA 10-15 (12.7), both relatively numerous and well developed, all arising on large pale pits, SC 10-14 (11.4).

Wing bare but highly granular, SQ 18-36 (25.8), anal lobe nearly rectangular. Costa extending beyond tip of R4+5, which is distal to tip of R4+5, R/Cu 1.05-1.10 (1.08). R2+3 separated, RR 0.44-0.49 (0.47), VR 1.15-1.19 (1.16). Cu2 slightly curved near the tip. Tip of front tibia (Fig. 31 e) with a long spur, 60 microns and 1.4 times as long as the diameter of front tibia at the tip. Tip of middle tibia (Fig. 31 f) with 2 spurs, 45 and 33 microns long. Tip of hind tibia (Fig. 31 g) with a long and a short spur, and a comb composed of 18 (very many) spines. Tips of middle tarsi I and II with two simple subapical spurs (Figs. 31 h, i), tips of hind tarsi I and III with one simple subapical spur (Figs. 31 j, k). fLR 0.51-0.53 (0.52), mLR 0.38-0.41 (0.39, very small), hLR 0.58-0.59, fTR 0.14-0.15, fBR 2.3-2.7 (2.5), mBR 2.5-3.5 (2.9), hBR 0.58-0.59. Pulvilli rather conspicuous, brush-like (Fig. 31 m, front tarsus V).

Setae on abdominal tergites (Fig. 31 n, right half) are rather numerous and all arising on pale pits, 48 in I, 64 on II and III, 60 on IV, 56 on V and VI, and 46 on VII and VIII. Hypopygium in Fig. 31 p. Anal point roughly V-shaped and with a broad rounded base, bearing an apical and numerous strong lateral setae. Virga (in Fig. 31 p) conspicuous and inverted V-shaped. Inner lobe of gonocoxite broad, rectangular, and with numerous short, strong setae. Gonostylus roughly V-shaped, composed of a long basolateral process with pointed apex and without setae, and an inner process with a rounded and expanded apex bearing a strong megaseta, a structure peculiar to this species.

**Remarks.** This species was so far recorded from only two localities in northern Japan, 2 type specimens collected by sweeping at the side of Stream Itachigawa in Toyama, and another male collected at the side of Osaru River, Hokkaido by Sasa (1988). It is a very surprising fact such a very rare species of was collected from such 3 remote localities in Japan.

**49. *Toyamayusurika tusimuabea* sp. nov.** (Figs. 32 a-m)

Seven males were collected, all by sweeping. Holotype: No. 353:56 (#3:12), on March

23, at Kubokawa.. Paratypes: No. 354:74 (#8:12), 354:77 (#8:14), 356:53 (#8:14:2) on March 24 at Azugawa, 355:06 (#11:16), 355:10 (#11:20), 356:57 (#10:20:2) at Sumokawa on March 25.

BL 2.60-2.91 (2.81 in average of 7)mm, WL 1.54-1.68 (1.62)mm, WW/WL 0.28-0.31 (0.30). Scutum, scutellum, and postnotum almost entirely black (in *shiotanii*, scutellum is pale), abdominal tergites and legs dark brown. Head in Fig. 32 a. Eyes bare, each with a wedge-shaped dorsomedial extension, ER 0.74-1.04 (mean 0.89, smaller than in *shiotanii*). Antenna with 13 flagellar segments, AR 1.10-1.22 (mean 1.14, slightly smaller than in *shiotanii*), AHR 0.51-0.57 (0.53). Palp short, P/H 0.81-0.96 (0.88, smaller). SO 6-10 (8.1), CL 4-6 (5.6, smaller), PN 4-7 (5.5, definitely smaller). Distribution of setae on scutum and scutellum in Fig. 32 c. DM 8-14 (10.4), DL 10-13 (11.7) PA 6-10 (7.4) SC 6-8 (7.0), all smaller than in *shiotanii*.

Wing membrane brownish and less granular than in *shiotanii*, anal lobe obtuse. Squama fringed with only 2, 3 or 4 setae (mean 3.0, definitely smaller than in *shiotanii*). Wing venation in Fig 32 d; RR 0.43-0.49 (0.46), VR 1.09-1.15 (1.12), R/Cu 1.09-1.15 (1.10). Costa slightly extended. Cu2 nearly straight. Tip of front tibia (Fig. 32 e) with a long spur, tip of middle tibia (Fig. 32 f) with two short spurs, tip of hind tibia (Figs. 32 g,h) with a long and a short spur, and a comb composed of 12 free spines. Tarsi I and II of middle and hind legs without subterminal spurs, which are present in *shiotanii*. fLR 0.57-0.59 (0.58), mLR 0.45-0.47 (0.46), hLR 0.56-0.61 (0.58), fTR 0.12-0.13, fBR 2.1-2.8 (2.4), mBR 2.9-3.8 (3.2), hBR 3.6-5.6 (%.5). All legs with two brush-like pulvilli (Fig. 32 i).

Setae on abdominal tergites (Fig. 32 j) are smaller in numbers, 24 on I, 40 on II to IV, 44 on V to VIII. Hypopygium in Fig. 32 k. Anal point very wide and roughly rectangular, with 12 marginal setae and entirely clothed with microtrichia, similar to that of *shiotanii*. Virga composed of some 10 narrow and long fibers, quite different from that of *shiotanii*. Inner lobe of gonocoxite (also in Fig. 32 m) small and rounded, with some 10 short setae but largely without microtrichia. Gonostylus (also in Fig. 32 n) with a long and narrow basal process and somewhat V-shaped like in *shiotanii*, but the basal arm is shorter and about half as long as the main arm, the latter with a long megaseta but not expanded apically like in *shiotanii*.

**Remarks.** This species belongs also to the genus *Toyamayusurika* Sasa et Kawai, 1987, since gonostylus has a long basal arm and somewhat V-shaped, anal point is wide, rectangular, with some 10 strong marginal setae and entirely covered by microtrichia, and legs with brush-like pulvilli. This species is somewhat related in structure to the type species, *shiotanii*, also recorded on this time on the same island, but represents definitely a different species, as pointed out in the text. Three other species have so far been recorded from Japan, as summarised by Sasa & Kikuchi (1995, p. 200), but the present species differs from all of them at least in the structure of gonostylus and anal point.

**50. *Toyamayusurika tusinuabecea* sp. nov.** (Figs. 33 a-k)

A male was collected by sweeping at Ayumodoshi on March 24. Holotype: No. 354:20 (#6:10). BL 3.00mm, WL 1.60mm, WW/WL 0.29. Scutum and postnotum largely dark brown, humeral areas and scutellum yellow, legs and abdomen brown. Head in Fig. 33 a. Eyes bare,

with a wedge-shaped dorsomedial projection, ER 0.83. Antenna with 13 flagellar segments, AR 1.11, AHR 0.54, last segment with a conspicuous apical seta. P/H 1.06. SO 8:8, CL 9. Anteprenotum (Fig. 33 b) united in the middle, with 6:6 lateral setae. Distribution of setae on scutum and scutellum in Fig. 33 c; DM 16, all minute; DL 12:12, PA 7:7, SC 11, all well developed.

Wing in Fig. 33 d. Wing membrane bluish and granular. Squama with 7:7 fringe hairs, anal lobe obtuse. Costa slightly extended beyond tip of R4+5, which is distal to tip of Cul, R/Cu 1.08. R2+3 separated, RR 0.58. VR 1.09. Cu2 nearly straight. Tip of front tibia (Fig. 33 e) with a long spur, 51 microns and 1.7 times as long as the diameter of front tibia at the tip. Tip of middle tibia (Fig. 33 f) with two short spurs, both 24 microns long. Tip of hind tibia (Fig. 33 g) with a long (62 microns), and a short (23 microns) spur, and a comb composed of 12 free spines. fLR 0.58, mLR 0.44, hLR 0.59, fTR 0.12, fBR 2.6, mBR 4.0, hBR 3.5. Tarsi I and II of middle and hind legs without preapical spur. Pulvilli conspicuous, brush-like (Fig. 33 h, middle tarsus V).

Distribution of setae on abdominal tergites in Fig. 33 i (left half), the numbers are 40 on I, 52 on II and III, 48 on IV to VII, and 44 on VIII, leaving the middle portions of II to VI free from setae. Hypopygium in Fig. 33 j. Anal point long, narrow, nearly parallel-sided and apically rounded, with 10 stout lateral setae, and basal 2/3 is covered by microtrichia. Virga absent. Inner lobe of gonocoxite nearly rectangular and with 16 short setae on dorsal side. Gonostylus (also in Fig. 33 k, ventral view of right gonostylus) with a conspicuous angulate basal process about half as long as the main arm, with long setae on both dorsal and ventral side, and a large megaseta at the tip.

**Remarks.** This specimen is considered as belonging also to *Toyamayusurika*, since gonostylus with a long basal process and roughly V-shaped, wing membrane granular, anal point with strong lateral setae and largely covered by microtrichia, wing membrane is granular, and legs with brush-like pulvilli, but anal point is very wide at base and triangular or T-shaped, not narrow and parallel-sided in all the previously recorded species of this genus. The basal arm is shorter in the present species than in the previously recorded ones.

#### ***Tusimayusurika* gen. nov.**

This is a member of the Tribe Orthoclaadiini in basic structure, but is characteristic in that wing without macrotrichia but highly granular, squama fringed, costa extended much beyond tip of R4+5, Cu2 nearly straight, eyes bare and each with a wedge-shaped dorsomedial projection, pulvilli absent, anal point absent, and inner lobe of gonocoxite small and rounded.

#### **51. *Tusimayusurika tusimucedea* sp. nov.** (Figs. 34 a-k)

A male was collected at Kudagawa on March 23. Holotype: No. 353:54 (#3:7). BL 3.40 mm, WL 2.01mm, WW/WL 0.28. Body largely black, excepting humeral areas slightly paler. Head in Fig. 34 a. Eyes bare, reniform, ER 0.74. Antenna with 13 flagellar segments, apical seta absent, AR 1.76, AHR 0.60. P/H 1.19. SO 10:10, CL 18. Anteprenotum (Fig. 34 b) united in the middle, with very many lateral setae, PN 8:10. Distribution of setae on scutum

and scutellum in Fig. 34 c. DM 16, all minute. DL 20, 22, arising from large pale pits. PA 8:8, SC 12.

Wing (Fig. 34 d) bare, but conspicuously granular, SQ 20:18, anal lobe obtuse. Costa extended much beyond tip of R4+5. R2+3 separated, RR 0.47. VR 1.27, R/Cu 1.08. Cu2 nearly straight. Tip of front tibia (Fig. 34 e) with a long (85 microns) spur. Tip of middle tibia (Figs. 34 f,g) with a longer (73 microns) and a shorter (36 microns) spur, and a comb composed of 6 free spurs, quite an unusual structure. Tip of hind tibia (Fig. 34 h) with a long (79 microns) and a short (31 microns) spur, and a comb composed of 14 free spurs. Pulvilli absent. fLR 0.59, mLR 0.50, hLR 0.60, fTR 0.12, fBR 2.7, mBR 2.7, hBR 3.2.

Setae on abdominal tergites (Fig. 34 i, right half) are relatively many, 64 on I and II, 72 on III, 92 on IV, 100 on V to VII, and 72 on VIII. hypopygium (in Figs. 34 j,k). Anal point absent, but ninth tergite with a low and broad lobe bearing 18 short setae, and a low, broad and V-shaped ridge in the middle. Inner lobe of gonocoxite small, narrow and roughly U-shaped, with short setae. Gonostylus strongly expanded in the middle, inner margin convex.

**Remarks.** This specimen is a typical member of the subfamily Orthocladiinae in its basic structure, and seems to be most related to members of genus *Trissocladius* Kieffer in that eyes and wings are bare, squama with fringe hairs, Cu2 is nearly straight, pulvilli absent, and wing membrane is highly granular. However, it has no anal point, and is quite unusual in that tip of middle tibia with a long and a short spur, and comb composed of 6 free spines, like in that of hind tibia, though the numbers of spines are smaller. Therefore, a new genus, *Tusimayusurika*, is created in order to accept this new species.

**52. *Tusimayusurika tusimudeea* sp. nov.** (Figs. 35 a-i)

A male was collected by sweeping at Ayumodosi on March 24. Holotype: No. 354:18 (#6:8). BL 3.76mm, WL 2.28mm, WW/WL 0.29. Scutum and postnotum largely black, scutellum, legs and abdomen brown. Head in Fig. 35 a. Eyes bare, each with a wedge shaped dorsomedial projection, ER 0.79. Antenna with 13 flagellar segments, AR 1.82, AHR 0.60, apical seta absent. Palp long, P/H 1.25. SO 12:12, CL 12. Anteprepronotum (Fig. 35 b) united, with 7:8 lateral setae. Distribution of setae on scutum and scutellum in Fig. 35 c. DM 16, all minute. DL 24:24, all well developed and arising from large pale pits. PA 10:11, SC 10.

Wing (Fig. 35 d) bare but highly granular, SQ 16:12, anal lobe obtuse. Costa extending much beyond tip of R4+5. R2+3 separated, RR 0.40, VR 1.24, R/Cu 1.06. Cu2 slightly curved near apex. Terminal structures of tibiae as usual, namely, tip of front tibia (Fig. 35 e) with a long spur, tip of middle tibia (Fig. 35 f) with two short spurs, tip of hind tibia (Fig. 35 g) with a long and a short spur, and a comb composed of 14 free spines. Pulvilli absent. fLR 0.70, mLR 0.53, hLR 0.61, fTR 0.11, fBR 2.6, mBR 2.8, hBR 3.8.

Setae on abdominal tergites (Fig. 35 h) are relatively numerous, 76 on I, 84 on II to VII, and 64 on VIII. Hypopygium in Fig. 35 i. Anal point absent, ninth tergite with a low, broad and rounded ridge bearing 14 setae. Inner lobe of gonocoxite very low, broad and rounded, bearing short setae. Gonostylus not expanded in the middle, curved inwards near apex, without preapical tooth.

**Remarks.** This specimen is a member of the subfamily Orthocladiinae and is also



related to the genus *Trissocladius* Kieffer, 1908 in that eyes and wings are bare, squama fringed, Cu2 nearl straight, pulvilli absent, wing membrane is highly granular, and costa is extended much beyond tip of R4+5, but the latter differs from the present species in that sharply pointed anal point is present. Therefore, the present species is very closely related to the above new species of the new genus *Tusimayusurika*, and is provisionally placed into it, but both differs essentially in the terminal structure of tibiae, it is normal in the present species but tip of middle tibia bears a comb in the former species.

### 53. *Corynoeura lobata* Edwards, 1924 (Figs. 37 a-k)

Three males were collected by sweeping at Uchiyama on March 24. No. 371:32, 33, 35 (#5:27:2, 3, 5). BL 1.61, 1.57, 1.62mm, WL 1.04, 0.98, 1.01mm, WW/WL 0.41, 0.43, 0.43. Thorax dark brown, legs and abdomen brown. Head in Fig. 40 a. Eyes bare, reniform, ER 1.44, 1.50, 1.26. Antenna with 11 flagellar segments, AR 0.31, 0.49, 0.29, AHR 0.29, 0.41, 0.32. Palp very short, P/H 0.51, 0.46, 0.54. Anteprenotum (Fig. 37 b) slightly separated, with 0:0, 1:0, 0:0 lateral lseta. Scutum and scutellum in Fig. 37 c; DM all 0, DL 5:5, 4:4, 4:3, PA 1:1, 2:2, 1:1.

Wing (Fig. 37 d) venation typical as a member of *Corynoneura*; veins R all united to thickened costa, 0.27, 0.29, 0.29% as long as the wing length. VR 0.58, 0.53, 0.59, R/Cu 0.35, 0.33, 0.34. Tip of front tibia (Fig. 37 e) with a long spur, tip of middle tibia (Fig. 37 f) with two spurs, tip of hind tibia (Fig. 37 g) strongly expanded, with a long and a short spur, and a comb composed of 16 free spines. Tarsi IV cordiform and shorter than tarsi V (Fig. h), hind tarsi III, IV and V. fLR 0.53, 0.52, 0.52, mLR 0.46, 0.50, 0.59, hLR 0.52, 0.57, 0.54, fTR 0.11, 0.11, 0.12, fBR 32, 31, 27, mBR 0.30, 0.29, 0.33, hBR 0.28, 0.26, 0.23.

Abdominal tergite (Fig. 37 i) I with 0, II to IV with only 1 (on the midline), VII with 3, VIII with 1 seta. Hypopygium in Figs. 37 j,k. Anal point absent. Inner lobe of gonocoxite low, broad and rounded. Gonostylus apically curved and tapering towards pointed apex.

**Remarks.** This species was recorded from Kyoto by Tokunaga (1936), by Sasa (1988) from Hokkaido, by Sasa, Kawai and Ueno (1988) and by Sasa and Okazawa (1992) from Toyama, and this is the first record from western Japan.

### 54. *Thienemanniella vittata* (Edwards, 1924) (Figs. 38 a-i)

Ten males were collected and identified. No. 354:07 (#5:26), 354:30 (#6:18), 354:52, 59, 60 (#7:21, 28, 29), 356:42 (#5:26:2), 371:29-31 (#5:26:3-5), 371:34 (#5:27:4). Scutal stripes, scutellum and postnotum dark brown, other scutal areas, abdomen and legs yellowish brown. Head in Fig. 38 a. Eyes pubescent, reniform, ER 1.32-1.80 (1.52). Antenna composed of 12 flagellar segments, AR 0.61-0.70 (0.65), AHR 0.40-0.46 (0.43). Palp short, P/H 0.74-0.85 (0.80). SO all 0, CL 9-14 (11.4). Anteprenotum (Fig. 38 b) united, with 0, 1, 2 or 3 lateral setae. Setae on scutum and scutellum in Fig. 38 c; DM all 0, DL 9-13 (10.7), PA 2 or 3 (2.3), SC 0 (in 1), 2 (in 5), 3 (in 1) or 4 (in 2).

Wing (Fig. 38 d) venation typical as a member of *Corynoneurini*, veins R united and fused with thickened costa, fCu much distal to R-M, distance between wing base and R is only 42-46% (43%) of distance between wing base and tip of Cul. Squama bare. Tip of front tibia (Fig. 38 e) with a long spur, tip of middle tibia (Fig. 38 f) with two short spurs, tip of

hind tibia not expanded and bearing a long and a short spur, and a comb composed of 12 free spines. Tarsi without terminal spur. Tarsi IV cordiform and shorted than tarsi V in all legs, pulvilli vestigial.

Setae on abdominal tergites (Fig. 38 h) are multiple in the numbers, 4 on I, 5 on II to V, 4 on VI and VII, and 3 on VIII in No. 354:52. Hypopygium in Fig. 38 i. Anal point and virga absent. Inner lobe of gonocoxite prominent, rectangularly produced and bearing short setae. Gonostylus simple, without preapical tooth.

**Remarks.** This is one of the cosmopolitan species of the genus *Thienemanniella* Kieffer, 1911, and has been recorded in Japan from Lake Biwa by Sasa and Kawai (1987), and from Toyama by Sasa (1990). The structure is typical as a member of the tribe Corynoneurini, but differs from those of genus *Corynoneura* especially in that tip of hind tibia is not expanded and abdominal tergites with multiple numbers of setae.

**55. *Thienemanniella tusimuefea* sp. nov.** (Figs. 39 a-k)

A male was collected by sweeping at Azugawa on March 23. Holotype: No. 353:35. BL 1.67mm, WL 1.06mm, WW/WL 0.42 (very wide). Scutal stripes and postnotum dark brown, scutellum, legs and abdomen brown. Head in Fig. 39 a. Eyes bare, reniform, widely separated, ER 1.72. Antenna with only 10 flagellar segments, AR 0.47, AHR 0.35, with a group of short apical sensory setae. Palp short, P/H 0.80. SO 0:0, CL 8. Anteprepronotum (Fig. 39 b) separated, with 0:1 lateral seta. Distribution of setae on scutum and scutellum in Fig. 38 c; DM 0, DL 5:5, PA 1:1, SC 2.

Wing (Fig. 39 d) bare, brownish, venation typical as a member of Corynoneurini, VR 0.59, R/Cu 0.44. Tip of fore tibia (Fig. 39 e) with a long spur (29 microns), tip of middle tibia (Fig. 39 f) with two short spurs (13 and 20 microns), tip of hind tibia (Fig. 39 g) not expanded, with a long (35 microns) and a short (21 microns) spur, and a comb composed of 12 free spines. fLR 0.66, mLR 0.62, hLR 0.69, fTR 0.12, fBR 2.9, mBR 3.3, hBR 3.4. Tarsi IV short and cordiform, pulvilli absent (Fig. 39 h, middle tarsi IV and V).

Abdominal tergites (Fig. 39 i) I and II with 4, III to IV with 6, and V to VIII with 4 setae. Hypopygium in Fig. 39 j, showing structures under ninth tergite. Anal point and virga absent. Gonocoxite with 3 inner lobes (Fig. 39 j), the distal one large, long and nearly rectangular, the basal one smaller and acutely angulate, and the middle one horn-like, long, narrow and apically pointed. Gonostylus simple, nearly parallel sided and without preapical tooth.

**Remarks.** This specimen is a typical member of the genus *Thienemanniella* Kieffer, 1911 in basic structure, but differs from all the previously known species of this genus in having three quite peculiarly shaped inner lobes on gonocoxite.

**56. *Thienemanniella tusimufega* sp. nov.** (Figs. 40 a-j)

Four males were collected by sweeping, during March 24-26. Holotype: No. 355:16 (#11:26). Paratypes: No. 354:08 (#5:27), 355:15 (11:25), 355:93 (#17:9). BL 1.58-1.84 (1.71)mm, WL 1.01-1.10 (1.05)mm, WW/WL 0.38-0.42 (0.40). Scutal stripes, scutellum and postnotum dark brown, other scutal parts, legs and abdominal tergites I to III yellowish brown, tergites IV to hypopygium brown. Head in Fig. 40 a. Eyes pubescent, reniform, ER 1.40-1.60 (1.54).

Antenna with only 10 flagellar segments like in the previous species, AR 0.61-0.69 (0.63), AHR 0.67-0.82 (0.73). Palp short, P/H 0.74-0.85 (0.80). Antepronotum (Fig. 40 b) narrowly separated, with 0, 1 or 2 (mean 1.6) lateral setae. Scutum and scutellum in Fig. 40 c; DM all 0, DL 5-10 (7.0), PA 1 or 2 (1.7), SC all 2.

Wing (Fig. 40 d) venation typical as a member of Corynoneurini, VR 0.56-0.61 (0.59), R/Cu 0.37-0.43 (0.41). Tip of front tibia (Fig. 40 e) with a long spur, tip of middle tibia (Fig. 40 f) with two short spurs, tip of hind tibia (Fig. 30 g) not expanded and with a long and a short spur, and a comb composed of 12 free spurs. Tarsi IV of all legs cordiform and shorter than tarsi V, pulvilli vestigial.

Setae on abdominal tergites in the holotype (Fig. 40 h) are 4 on I to VI, and 2 on VII and VIII. Hypopygium in Figs. 40 i,j. Anal point absent. Inner lobe of gonocoxite only slightly expanded. Gonostylus simple, without preapical tooth.

**Remarks.** This species is structurally also a typical member of genus *Thienemanniella*, but differs from all the other previously known species of this genus in that antenna with only 10 flagellar segments, AR is 0.61-0.69, and inner lobe of gonocoxite is only slightly produced inwards.

### Subfamily TANIPODINAE

#### 57. *Ablabesmyia monilis* (Linnaeus, 1761)

A male was collected by sweeping at Azugawa on March 23. No. 353:36 (#1:4). BL 4.73mm, WL 2.73mm, WW/WL 0.31. Scutum and postnotum largely dark brown, scutellum yellow, abdominal tergites largely yellow but VI and VII largely brown and caudal areas yellow; femora largely yellow and with a preapical brown ring; tibiae with 3 brown rings; tarsi I to IV each with a brown distal ring, V brown. Eyes bare, each with a long and narrow dorsomedial projection, ER 0.49. Antenna with 13 flagellar segments, AR 1.80. AHR 0.60. Palp long, P/H 1.30. SO 44, 42 CL 45, both very many. Antepronotum united, with 8:8 lateral setae. DM 82, DL 60:60, PA 31:30, SC 46, all very many. Wing entirely clothed in macrotrichia, with a dark mark around R-M. RR 0.47, VR 0.82, R/Cu 1.22. fLR 0.77, mLR 0.71, hLR 0.81, fTR 0.14, fBR 3.0, mBR 5.2, hBR 5.3. Pulvilli absent. Hypopygium, especially basal lobes of gonocoxite, are highly complicated in structure, and needs to be comparatively studied with related specimens.

#### 58. *Conchapelopia quatuormaculata* Fittkau, 1962

Six males were identified. No. 353: 62 (#3\*1), 354:14 (#6:4), 356:43, 44 (#6:4:2, 3), 371:36, 37 (#6:4:4, 5). The measurement data of No. 356:43: BL 5.22mm, WL 2.86mm, WW/WL 0.29, ER 0.33, AR 2.07, AHR 0.61, P/H 1.47 (very high), SO 20:18, CL 28, PN 7:7, DM 52, DL 28:32, PA 24:24, SC 38, SQ 38:42, RR 0.47, VR 0.88, R/Cu 1.18, fLR 0.78, mLR 0.61, hLR 0.70, fTR 0.12, fBR 3.8, mBR 5.4, hBR 5.7. This species was recorded from Japan by Tokunaga (1937) by the name of *Pentaneura melanops* (Meigen), but was renamed as above, without giving comments.

#### 59. *Conchapelopia tusimugehea* sp. nov. (Figs. 41 a-i)

A male was collected by sweeping at Izumi on March 26. Holotype:: No. 355:48 (#15:3).

BL 4.92mm, WL 2.74mm, WW/WL 0.29. Body almost entirely pale yellow, excepting abdominal tergite VII which is brown for basal half. Head in Fig. 41 a. Eyes bare, each with a long, parallel-sided dorsomedial projection, ER 0.30. Antenna with 14 flagellar segments, last segment short and with an apical seta, AR 2.21, AHR 0.70. Palp long, P/H 1.32. SO 22:20, CL 18. Anteprenotum (Fig. 41 b) 9 slightly separated, with 7:7 lateral setae. DM 56, DL 36:39, PA 15:16, SC 30. Wing in Fig. 41 d (macrotrichia and fringe hairs omitted). Membrane with macrotrichia on almost entire surface, without dark marks, SQ 24:30. RR 0.43, VR 0.89, R/Cu 1.17. Tip of front tibia (Fig. 41 e) with 1, tip of middle tibia (Fig. 41 f) with 2 spurs, tip of hind tibia (Figs. 41 g,h) with 2 spurs and a comb composed of only 7 simple spines. The tibial spurs are all composed of the main tooth and 5-7 shorter side teeth. fLR 0.78, LR 0.59, hLR 0.69, fTR 0.12, fBR 3.8, mBR 4.9, hBR 5.6.

Hypopygium in Fig. 41 i. Ninth tergite with a pair of lobes bearing 5 short setae. Gonocoxite with a large basal lobe, each with short lateral processes on basal 1/3, longer lateral processes on middle 1/3, and slightly longer processes on distal 1/3. Gonostylus long, rectangularly curved at about distal 1/3.

**Remarks.** This species has the structure of wings and hypopygium as a typical as a member of genus *Conchapelopia* Fittkau, 1957, and belongs to the group having basal lobe of gonocoxite without a long basolateral arm and with lateral processes of nearly equal length along entire length. It is therefore similar in structure of hypopygium and body coloration to *C. pallidula* (Meigen) and *C. viator* (Kieffer), but differs from both in that thorax and abdomen are entirely pale excepting anterior half of abdominal tergite VII which is dark brown, processes of gonocoxite lobe are almost uniform and longer, and gonostylus is rectangularly curved. The present species is also similar in body coloration and structure to *C. togapallida* Sasa et Okazawa, 1992, but again differs from it in that abdominal tergite VIII is partly dark brown, and gonostylus is rectangularly curved. The figures of *Conchapelopia* spp. which should be placed in Plate 93, p. 305 of Sasa & Kikuchi (1995) were transferred by mistake to page 306, and the figures in page 305 should be all transferred to page 306 in exchange.

#### 60. *Paramerina tusimuheia* sp. nov. (Figs. 42 a-j)

Nine males were collected and identified. Holotype: No. 353:37 (#1:5). Paratypeps: No. 353:80 (#1:5:2), 353:61 (#3:3), 355:49 (#15:4), 355:73 (#16:5), 356:21 (#3:3:2), 372:03-05 (1:5:2-4). BL 3.86-4.94mm (4.38 in average of 9), WL 2.28-2.96 (2.58)mm, WW/WL 0.28-0.30 (0.29). Scutal stripes and postnotum dark brown, other body portions largely yellow, but tergite VII entirely brown and darker than the rest abdominal tergites. Head in Fig. 42 a. Eyes bare, each with a long and parallel-sided dorsomedial projection, ER 0.24-0.45 (0.33). Antenna with 14 flagellar segments, AR 1.881-2.22 (1.97), AHR 0.63-0.68 (0.65). Palp long, P/H 1.39-1.85 (1.64). SO 15-19 (17.0), CL 21-32 (25.7). Anteprenotum (Fig. 42 b) separated, with 4-9 (6.6) lateral setae. Distribution of setae on scutum and scutellum in Fig. 42 c; DM 40-70 (58.0), DL 28-40 (35.1), PA 8-17 (13.9), SC 24-32 (24.9).

Wing (Fig. 42 d) without dark marks, with macrotrichia on almost entire surface, costa extending only slightly beyond tip of R4+5 and ending proximal to tip of M. RR 0.43-0.52 (0.46), VR 0.83-0.86 (0.85), R/Cu 1.12-1.19 (1.15). Tip of front tibia (Fig. 42 e) with one

fan-shaped slightly longer spur and 9 shorter spurs, tip of middle tibia (Fig. 42 f) with a long and a short scale composed of a long and short spurs, tip of hind tibia (Figs. 42 g,h) with a long and a short scale, and a comb composed of some 6 and 3 spines arranged in two rows. Pulvilli absent. fLR 0.71-0.84 (0.78), mLR 0.63-0.71 (0.68), hLR 0.69-0.73 (0.71), fTR 0.12-0.14 (0.13), fBR 3.6-6.7 (5.2), mBR 4.8-6.4 (5.7), hBR 5.3-8.6 (7.0).

Abdominal tergites with relatively large numbers of setae, and those on II to VII are arranged into the median and the lateral groups. Hypopygium in Fig. 42 i. Ninth tergite with a prominent V-shaped phallapodeme, and a transverse ridge bearing 6 prominent setae. Gonocoxite without basal process. Gonostylus simple and slightly curved.

**Remarks.** These specimens belong to a species of the tribe Pentaneurini, since cross vein M-Cu is distal to FCu, postnotum without setae, and costa not extending much beyond tip of R4+5. They further belong to the group without basal lobe on gonocoxite, wing membrane without dark marks, tip of costa proximal to tip of M, posterior tibia with two apical scales, phallopodemes are long and darkened, and are thus classified into the genus *Paramerina* Fittkau, 1962. In the 5 species of this genus recorded by Fittkau (1962), most abdominal tergites have a dark band, but in the present species they are largely pale and only VII is largely brown. Three species of this genus have been recorded from Japan (Sasa & Kikuchi, 1995), but they all have brown marks on abdominal tergites. The AR values of 1.81-2.22 are also larger than in the previously recorded species of this genus.

#### 61. *Rheopelopia ornata* (Meigen, 1838) (Figs. 43 a-h)

Two males were collected by sweeping at Uchiyama on March 24. No. 353:70 (#5:3), 356 (#5:3:2). BL 5.14, 5.24mm, WL 2.74, 2.82mm, WW/WL 0.30, 0.30. Ground color of scutum, and scutellum white, scutal stripes largely yellow and with 3 pairs of dark brown spots, one in the middle part of median stripes, one along the lateral margin of lateral stripes, and another posterior to the lateral stripes. Postnotum largely dark brown. Abdominal tergite I entirely pale, II to VIII each with a broad brown band along anterior margin. Legs largely yellow but all femora with a narrow brown ring preapically. Head in Fig. 43 a. Eyes bare, both with a long and narrow dorsomedial projection, ER 0.35, 0.33. Antenna with 14 flagellar segments, last segment very short and with an apical seta, AR 2.02, 2.04, AHR 0.72, 0.68. Palp long, P/H 1.56, 1.44. SO 20:22, 26:26, CL 24, 24. Anteprepronotum united in the middle, with 6:6, 8:8 lateral setae. Scutum and scutellum in Fig. 43 b (showing right side dark areas). DM 50, 46, DL 40:38, 40:41, PA 20:18, 17:17, SC 68, 64.

Wing in Fig. 43 c (macrotrichia and fringe hairs omitted). Membrane with macrotrichia on entire surface, and three faint transverse dark bands, the cross vein R-M area is especially darker. Squama with 30:30, 26:28 fringe hairs. R2+3 forked near tip and R2 is united to R1, RR 0.45, 0.40. VR 0.91, 0.90, R/Cu 1.14, 1.15. Cross vein M-Cu slightly distal to FCu. Tip of front tibia (Fig. 43 d) with one, middle (Fig. 43 e) and hind tibiae (Figs. 43 f, g) with two terminal scales, each composed of a long and sharply pointed main shaft and 4-8 basal barbs. Tip of hind tibia with a comb composed of 4 or 5 spines. Tarsus III of middle legs with a distal group of strong setae. Small brush-like pulvilli present in this species. fLR 0.81, 0.79, mLR 0.62, 0.59, hLR 0.71, 0.75, fTR 0.14, 0.12, fBR 4.2, 4.6, mBR 4.9, 7.4, hBR 5.8, 5.6.

Hypopygium in Fig. 43 h. Ninth tergite small, low and broad, posterior margin concave but produced in the middle forming two rounded anal point like processes, and with 14 long setae along posterior margin. Basal process of gonocoxite composed of a large and rounded inner lobes each bearing one long and narrow lateral process, both thickly clothed with numerous short setae. Gonostylus long, smoothly curved, widest near base and tapering towards pointed apex each bearing long megaseta.

**Remarks.** This species has been recorded from Japan so far only once by Sasa and Okazawa (1993) with a single male collected at Bijodaira, a highland in Toyama. The present specimens are larger in body size (WL 2.35mm in Toyama specimen) and AR is also larger (1.58 in the latter). The peculiar structure of ninth tergite is more clearly shown in the present specimen.

**62. *Trissopelopia oyabetrispinosa* Sasa, Kawai et Ueno, 1988** (Figs. 44 a-i)

A male was collected by sweeping at Izumi on March 26. No. 355:50 (#15:5). BL 5.11 mm, WL 3.16mm, WL 3.16mm, WW/WL 0.28. Scutal stripes uniformly dark brown, humeral area pale, scutellum pale, postnotum dark brown. Legs almost uniformly brown. Abdominal tergite I pale, II to VIII pale along oral and caudal margins and each with a broad transverse brown band occupying about half the width of each segment. Head in Fig. 44 a. Eyes bare, ER 0.29. Antenna with 14 flagellar segments, AR 2.20, AHR 0.60, last segment with a prominent apical seta. Palp very long, P/H 1.78, the second segment with a group of very strong, darkly pigmented setae arising from distal half. SO 26:26, CL 20. Anteprenotum Fig. 44 b united in the middle, PN 6:6. Setae on scutum and scutellum in Fig. 44 c; DM 52, DL 31:34, PA 16:18, SC 31.

Wing (Fig. 44 d) almost entirely clothed with macrotrichia, without dark marks. SQ 37:34, RR 0.48, VR 0.80, R/Cu 1.17. R2+3 forked, R2 is connected with R1, R3 does not reach to costa. Costa extending slightly beyond tip of R4+5. M-Cu slightly distal to FCu. Tip of front tibia (Fig. 44 e) with one, tips of middle (Fig. 44 f) and hind (Figs. 44 g,h) tibiae with two comb scales, all low, small and broad, those on middle tibia with a short and pointed principal spur, but those on front and hind tibiae without the principal spur and the spurs are almost equal in length. Hind tibia with a comb composed of 5 or 6 rather irregularly distributed spines. All legs with a pair of large brush-like pulvilli. fLR 0.61, mLR 0.72 (larger than fLR), hLR 0.73, fTR 0.08, fBR 2.8, mBR 3.2, hBR 3.8.

Hypopygium in Fig. 44 i. Ninth tergite with long and slightly darkened pallapodeme. Anal point absent. Gonocoxite without basal lobe, and basal 1/3 of inner margin thickly clothed in numerous short setae. Gonostylus simple, inner margin slightly concave and tapering towards pointed apex.

**Remarks.** This specimen is considered as belonging to the genus *Trissopelopia* Kieffer, 1923, and the above morphological characters seem to be almost coincident with that of *T. oyabetrispinosa* Sasa, Kawai et Ueno, 1988, which was first recorded from Oyabe River, and later in large numbers from Toga, all in the mountainous areas of Toyama Prefecture. This species is especially characteristic in body coloration, the structure of tibial comb scales, hypopygium, and is differentiated from the cosmopolitan species *T. longimana* (Staege) by

the presence of terminal comb on hind tibia (usually 3 in Toyama specimens, 5 or 6 in the present specimen).

#### ACKNOWLEDGEMENTS

Many thanks are due to Mrs. Setsuko Suzuki for the preparation of slide mounted specimens, and to Ms. Miyoko Takagi and Mr. Hidefumi Tanaka for assistances in the arrangements of this study.

#### REFERENCES

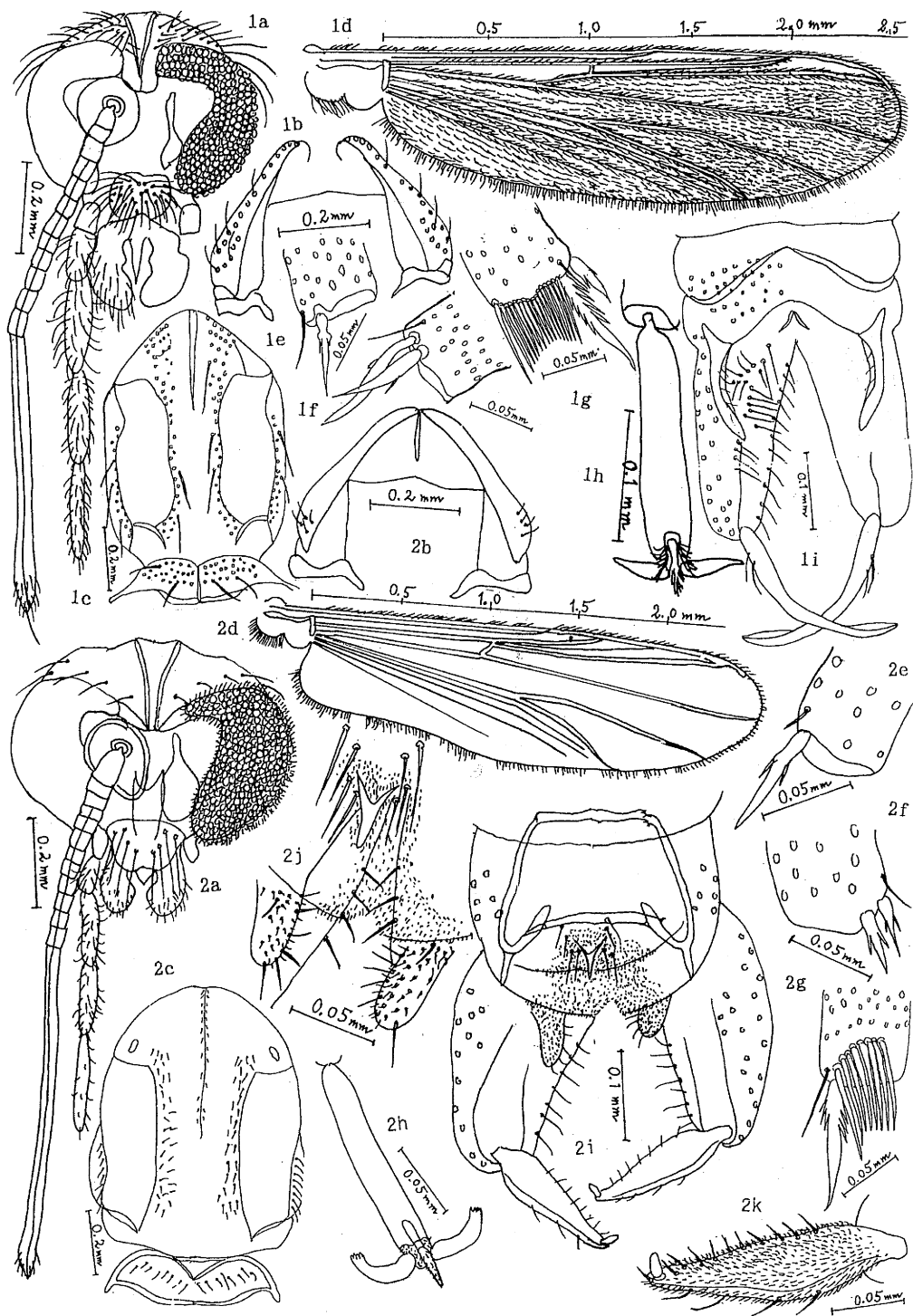
All the references to taxonomy and identification of Chironomidae of Japan are listed in the following two monographs, together with the methods of collection, preparation, and identification of the specimens, and keys to species identification.

- 1) Sasa, M. & M. Kukuchi (1995): Chironomidae of Japan. 333 pp. Univ. Tokyo Press.
- 2) Sasa, M. (1998): Chironomidae of Japan. 156 pp. Kankyo Fukushi Kenkyusho Additional references recently published.
- 3) Sasa, M. & Suzuki, H. (1998): Studies on the chironomid midges collected in Hokkaido and northern Honshu. Trop. Med. 40 (1): 9-43
- 4) Sasa, M., H. Suzuki & T. Sakai (1998): Studies on the chironomid midges collected on the shore of Shimanto River in April 1998. Part 1. Description of species of the subfamily Chironominae. Trop. Med. 40 (2): 47-89

The following two books were used as references to the general taxonomy.

Pinder, L.C.V. (1978): A key to adult males of British Chironomidae. Freshwater Biol. Assoc. Sci. Publ. No. 37, 169 pp., Fig. 189

Wiederholm, T. (1989): Chironomidae of the Holarctic region. Keys and diagnosis. Part 3. Adult males. Entom. Scand. Suppl. 34, 532 pp.



**Fig. 1.** *Pseudobrillia komorii* Niitsuma, 1991

**Fig. 2.** *Cricotopus tusimoabeus* sp. nov.



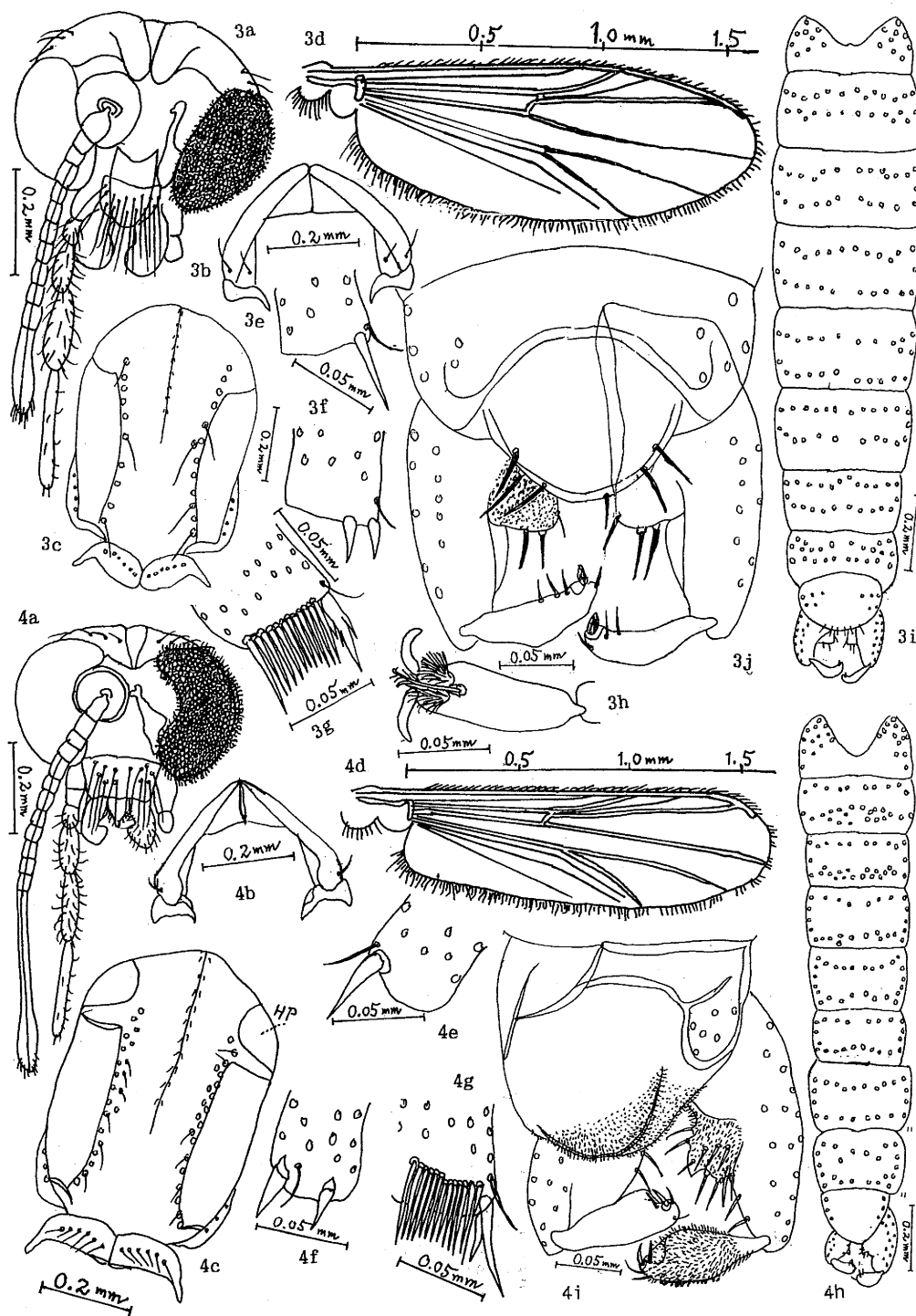


Fig. 3. *Paratrichocladius tusimobeceus* sp. nov.  
 Fig. 4. *Paratrichocladius tusimocedeus* sp. nov.

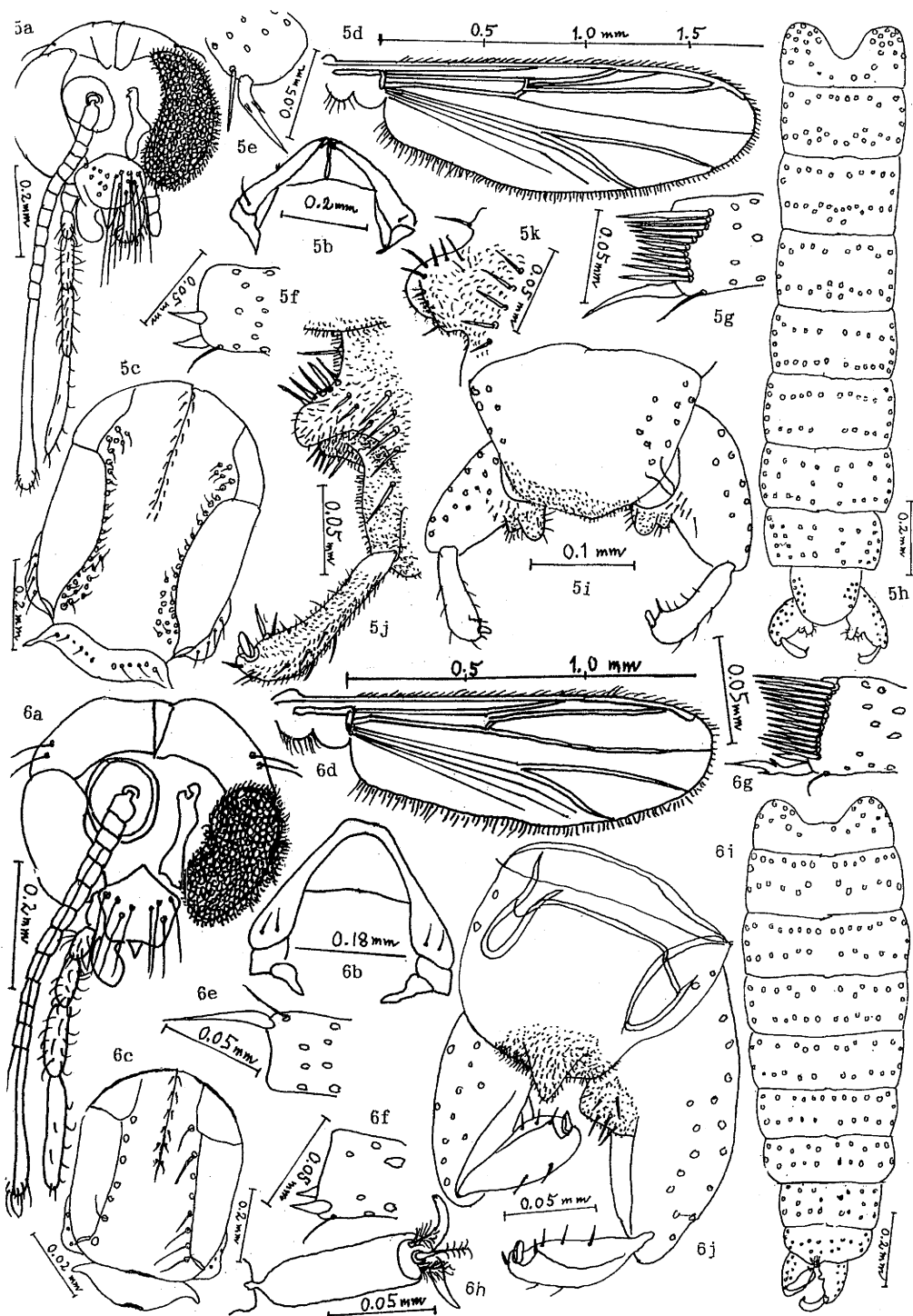


Fig. 5. *Paratrachocladus tusimodeus* sp. nov.

Fig. 6. *Rheocricotopus tusimoeus* sp. nov.

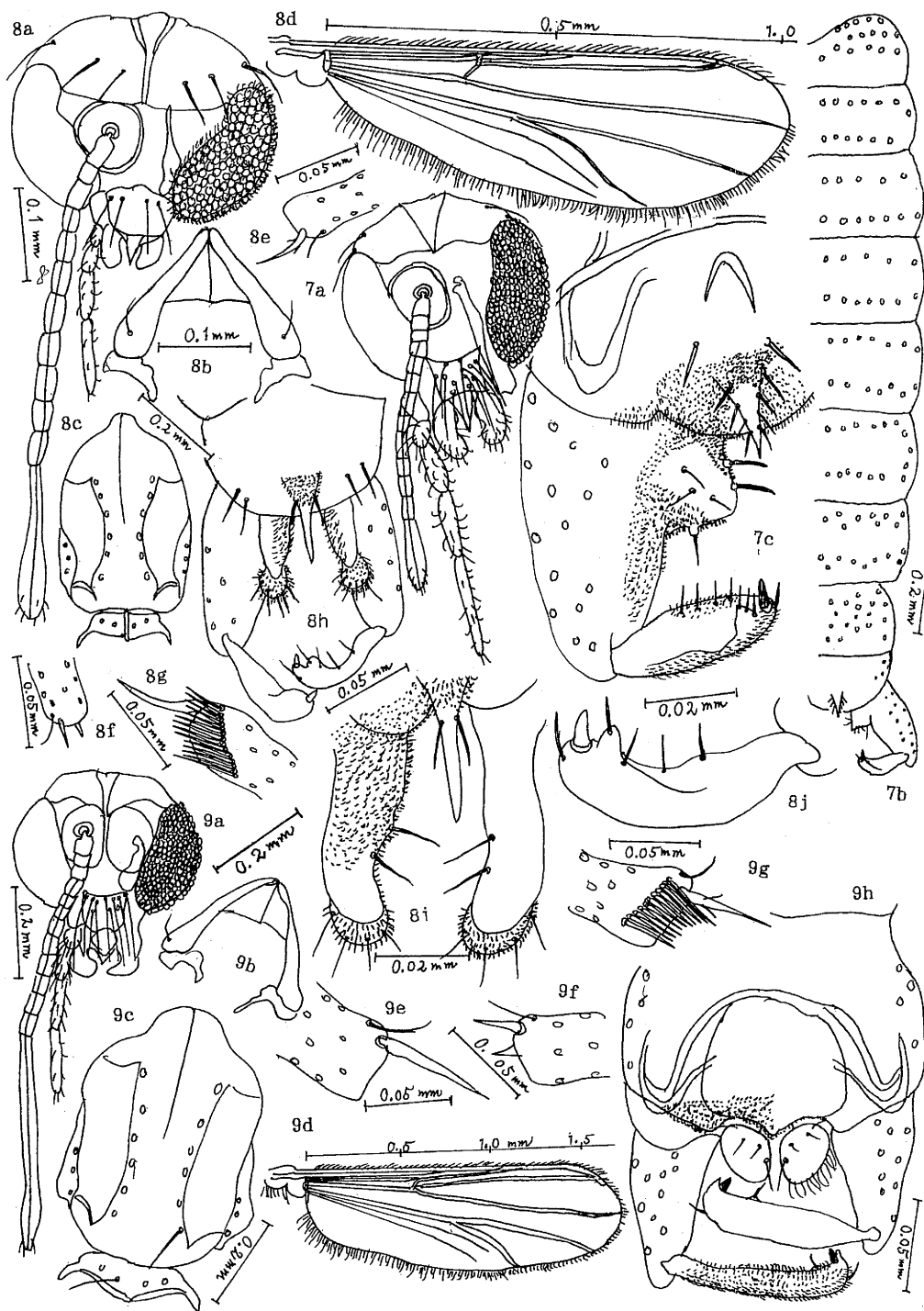
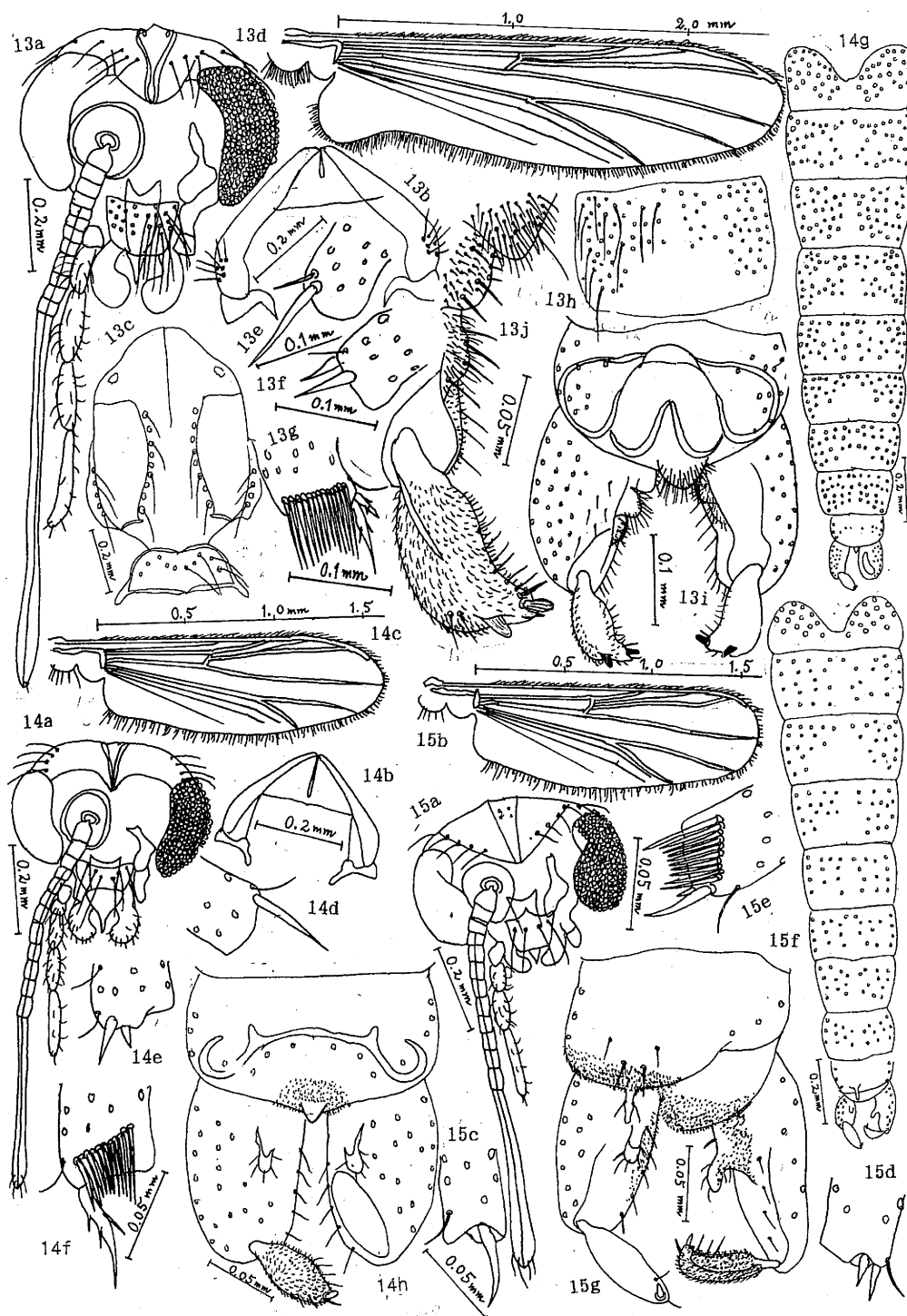


Fig. 7. *Rheocricotopus tamabrevis* Sasa, 1983

Fig. 8. *Eukiefferiella kurobekeyakia* Sasa et Okazawam 1992

Fig. 9. *Eukiefferiella tusimofegea* sp. nov.





**Fig. 13.** *Eukiefferiella tusimoijea* sp. nov.

**Fig. 14.** *Eukiefferiella tusimojekea* sp. nov.

**Fig. 15.** *Eukiefferiella tusimokelea* sp. nov.

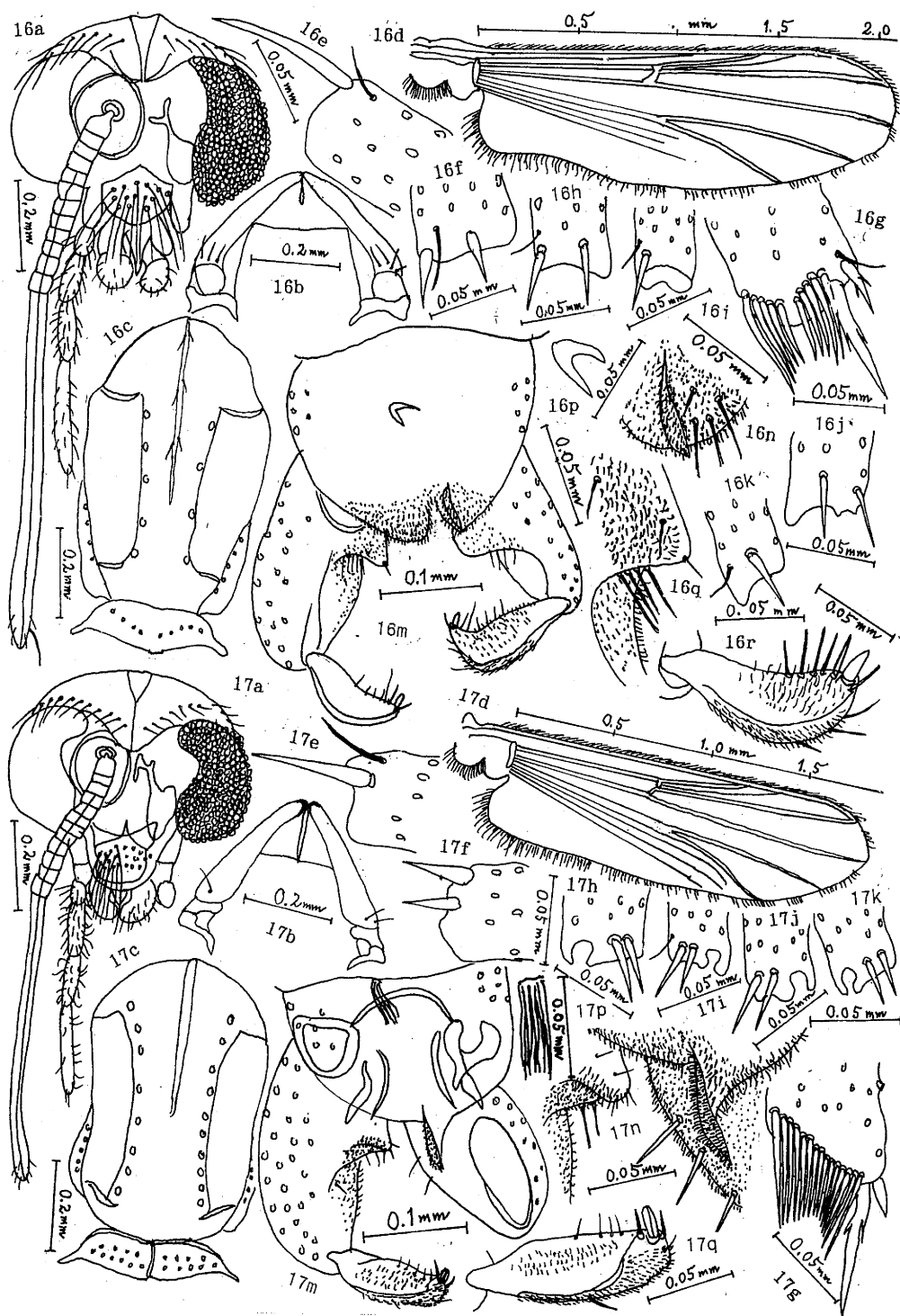


Fig. 16. *Hydrobaenus tusimolemeus* sp. nov.

Fig. 17. *Hydrobaenus tusimomeneus* sp. nov.

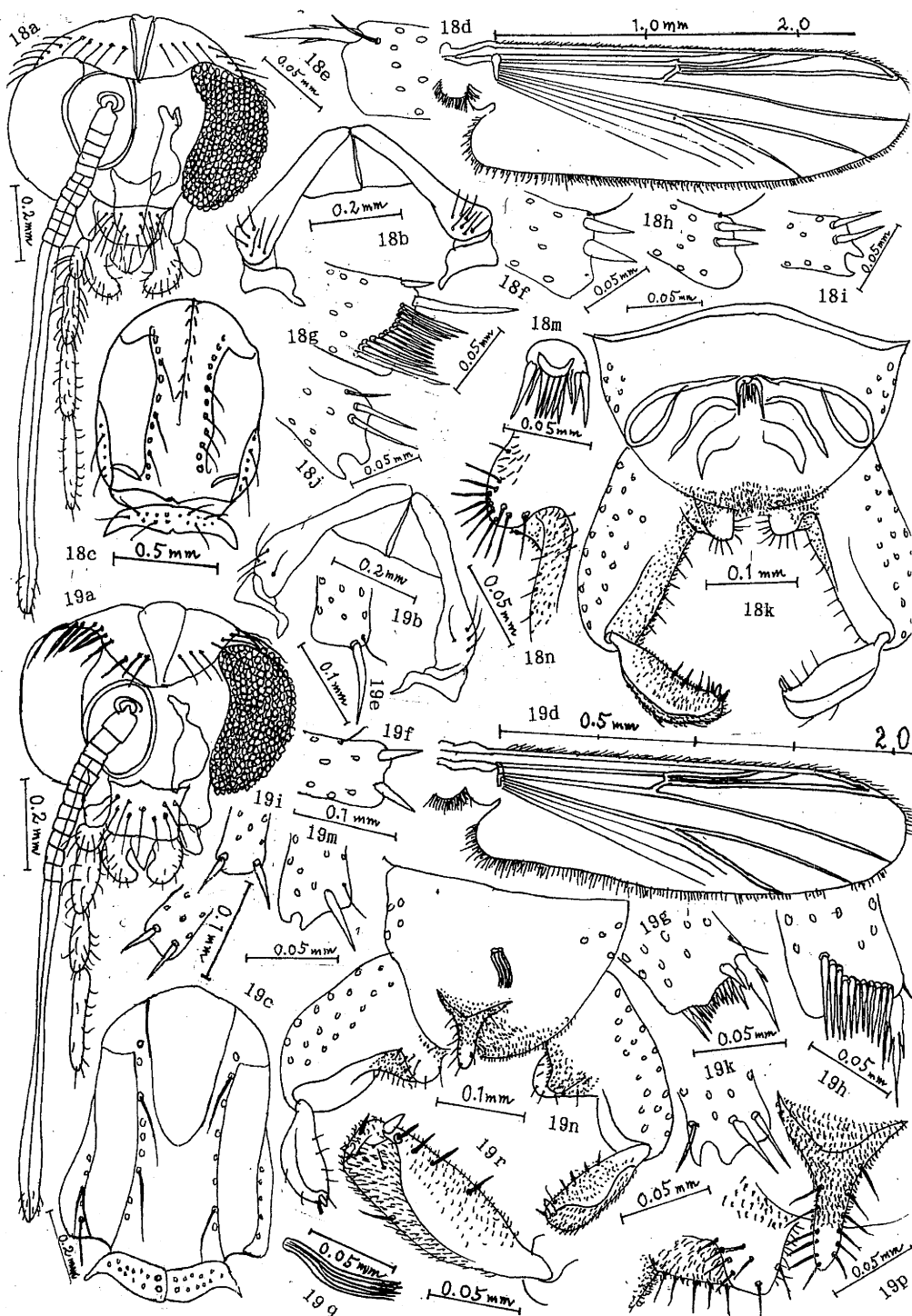


Fig. 18. *Hydrobaenus tusimoneus* sp. nov.

Fig. 19. *Orthocladius (Euoryhocladius) tusimoopeus* sp. nov.

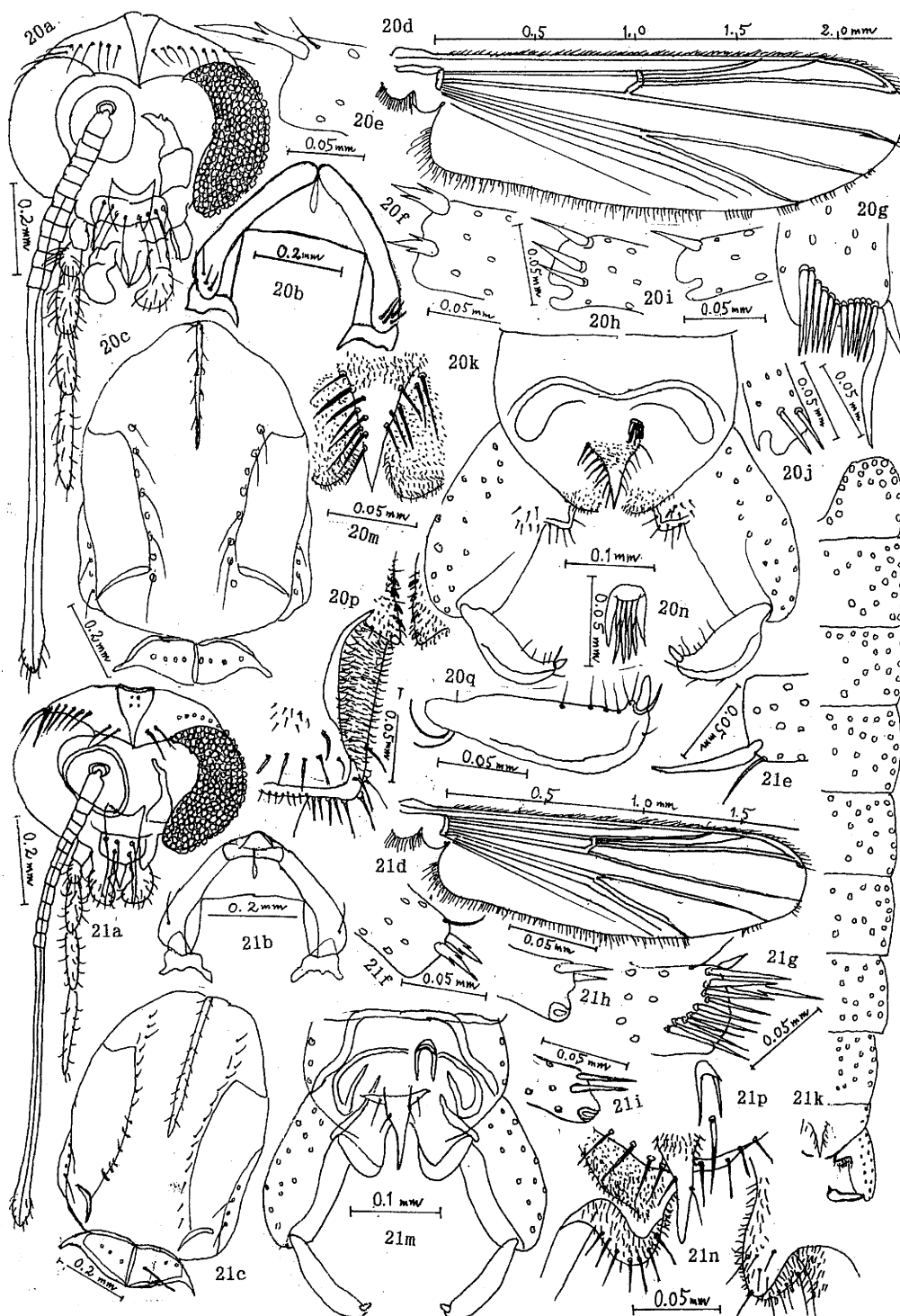


Fig. 20. *Orthocladius (Orthocladius) makabensis* Sasa, 1979  
 Fig. 21. *Orthocladius (Orthocladius) tusimopequeus* sp. nov.



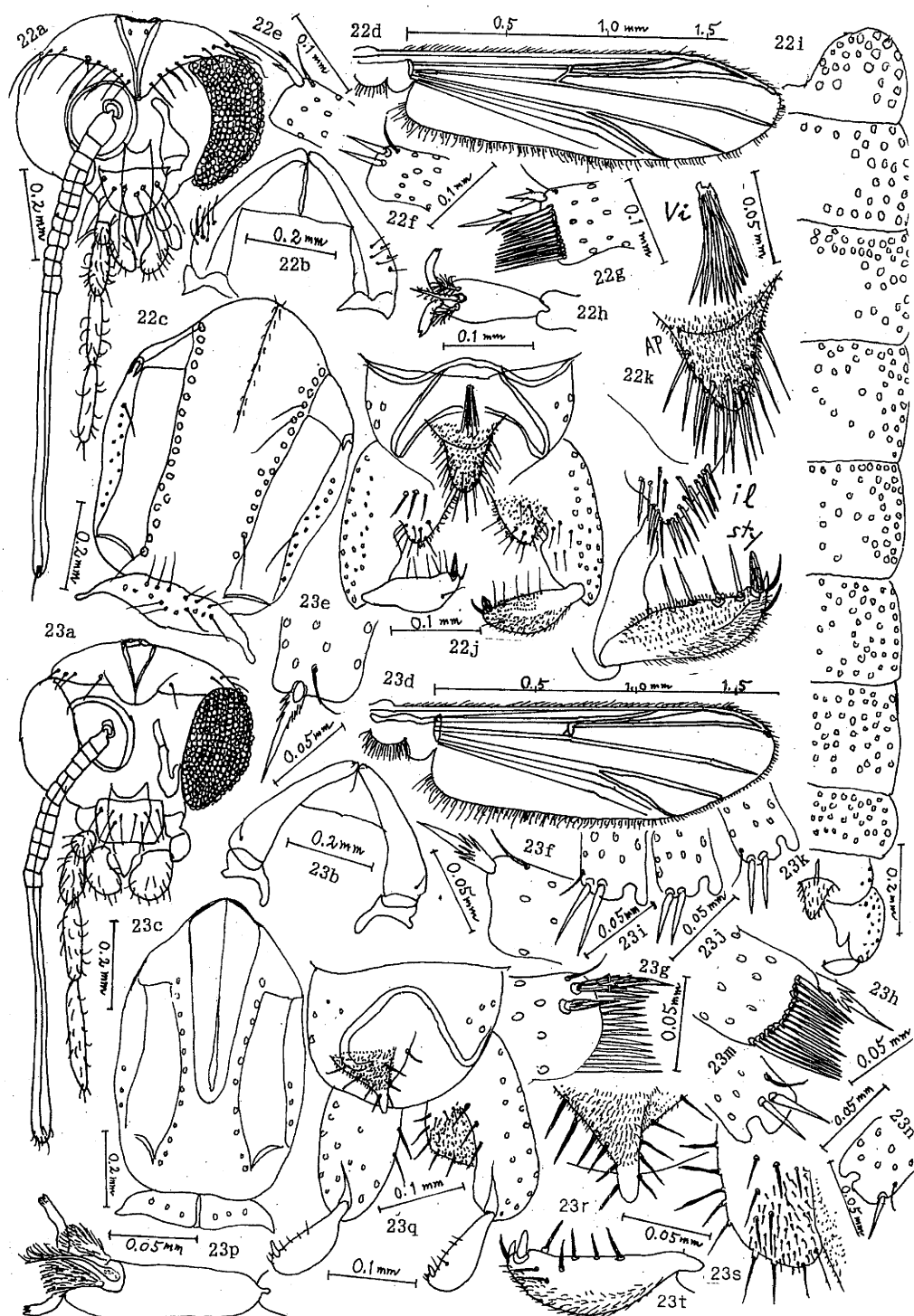


Fig. 22. *Psectrocladius (Monopsectrocladius) tusimoquereus* sp. nov.  
 Fig. 23. *Psectroladius (Psectrocladius) tusimoreseus* sp. nov.

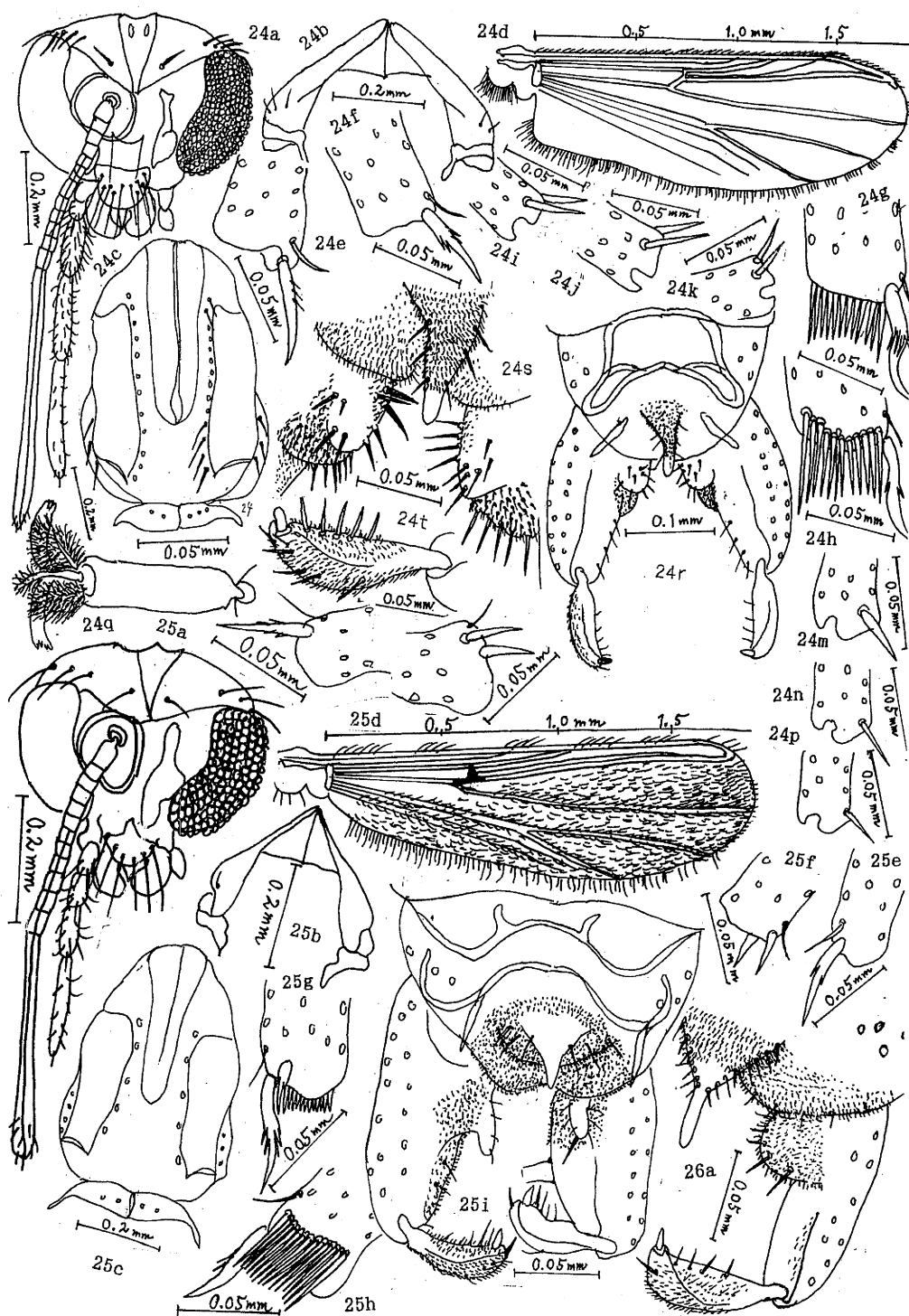


Fig. 24. *Psectrocladius (Psectrocladius) tusimosetatus* sp. nov.

Fig. 25. *Heterotrissocladius* sp. *tusimoteus*

Fig. 26. *Parametriocneme stylatus* (Kieffer, 1924)

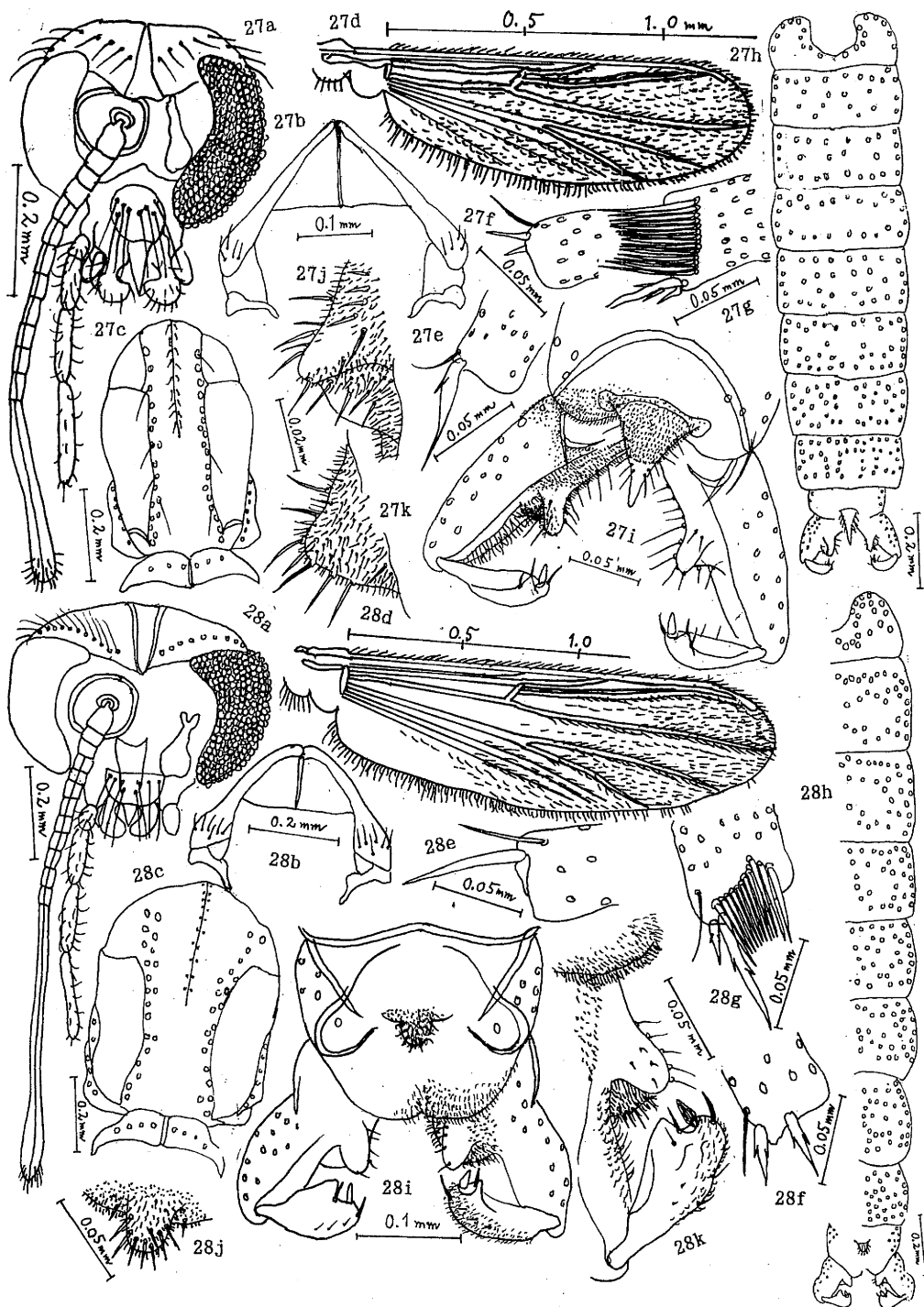


Fig. 27. *Metriocnemus tusimouweus* sp. nov.  
 Fig. 28. *Metriocnemus tusimoveweus* sp. nov.

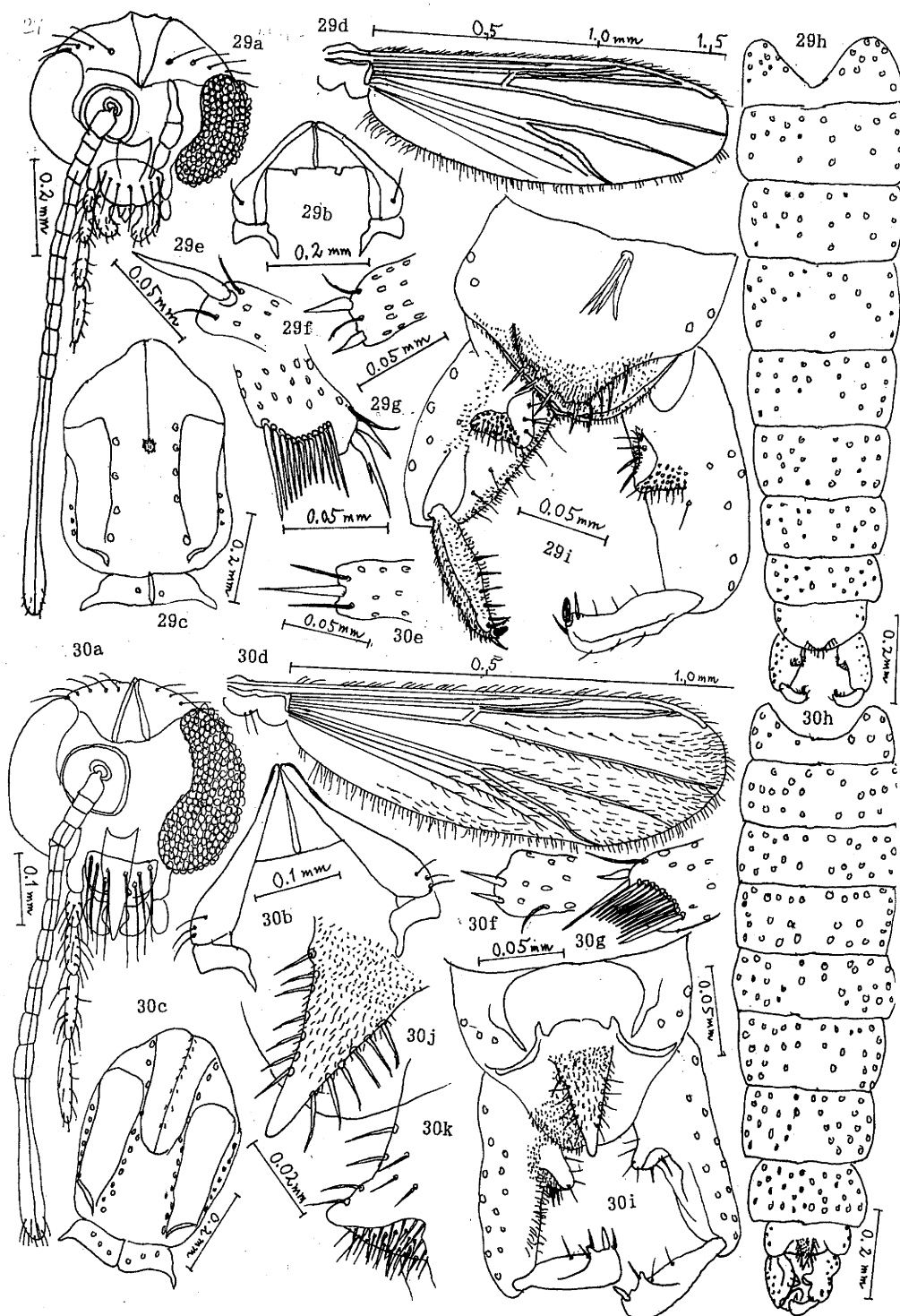


Fig. 29. *Parakiefferiella tusimowexeus* sp. nov.  
 Fig. 30. *Paraphaenocladus tusimowexeus* sp. nov.

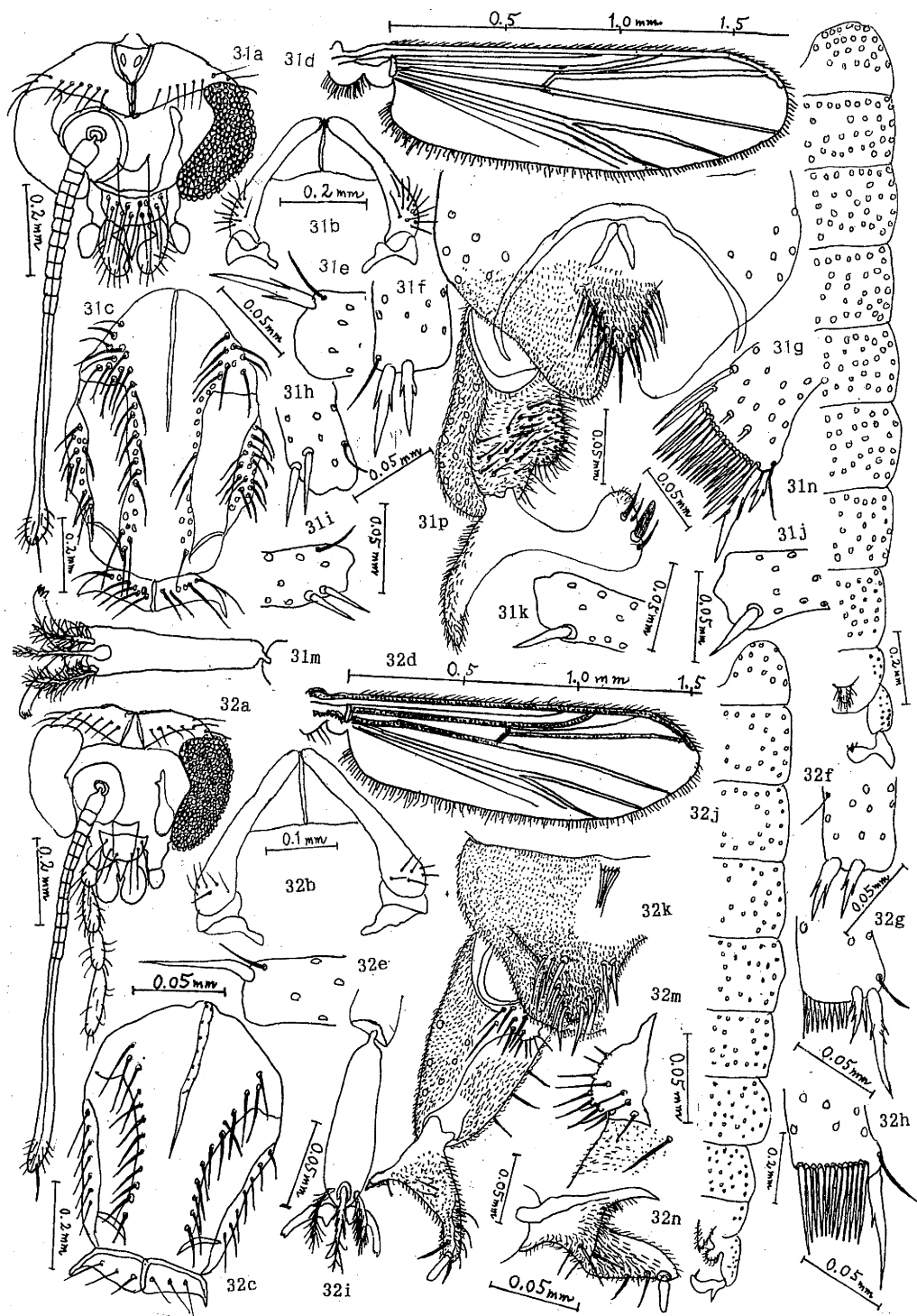


Fig. 31. *Toyamayusurika shiotanii* Sasa et Kawai, 1987  
 Fig. 32. *Toyamayusurika tusimuabea* sp. nov.

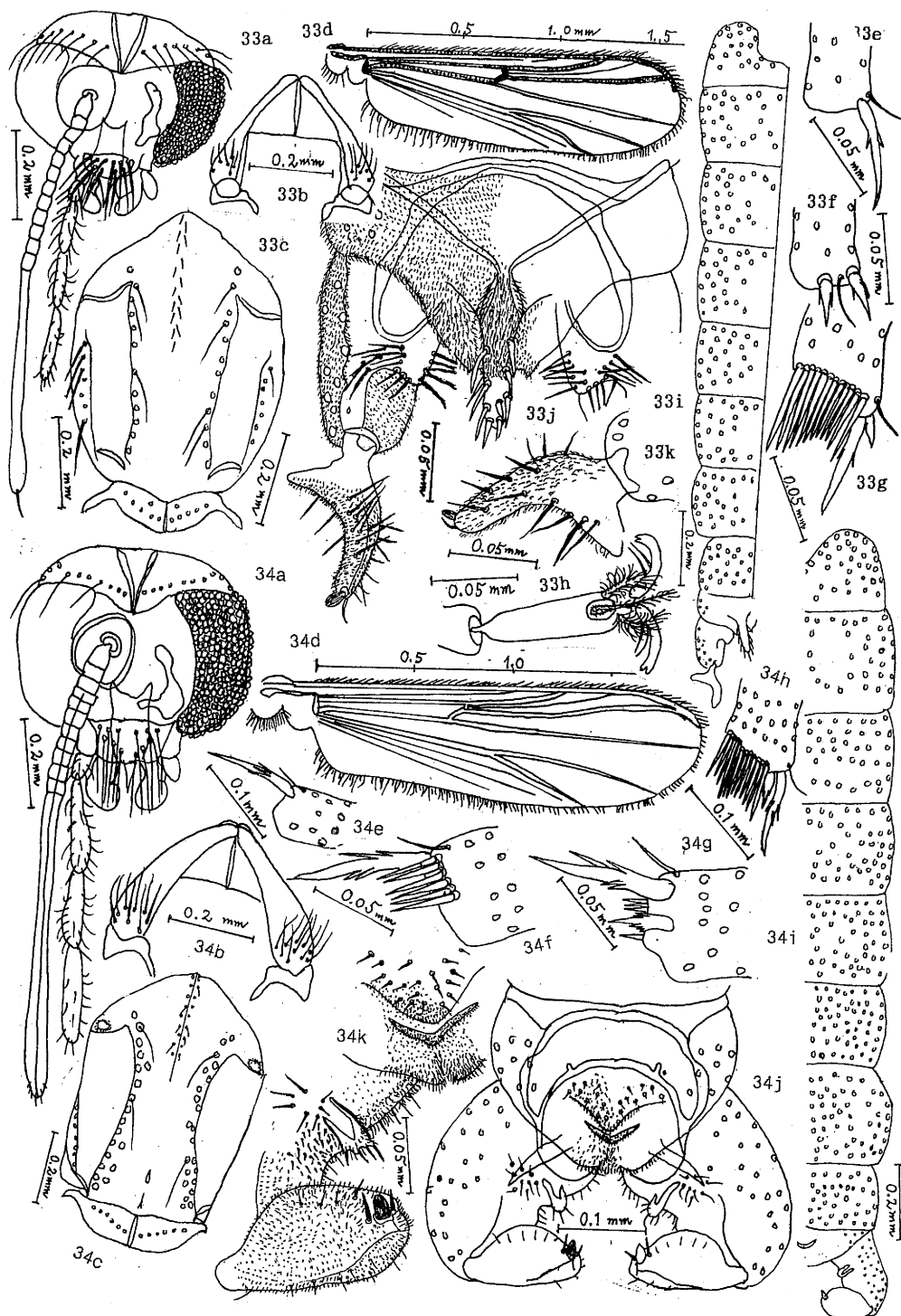


Fig. 33. *Toyamayusurika tusimubeces* sp. nov.  
 Fig. 34. *Tusimayusurika tusimucedea* sp. nov.

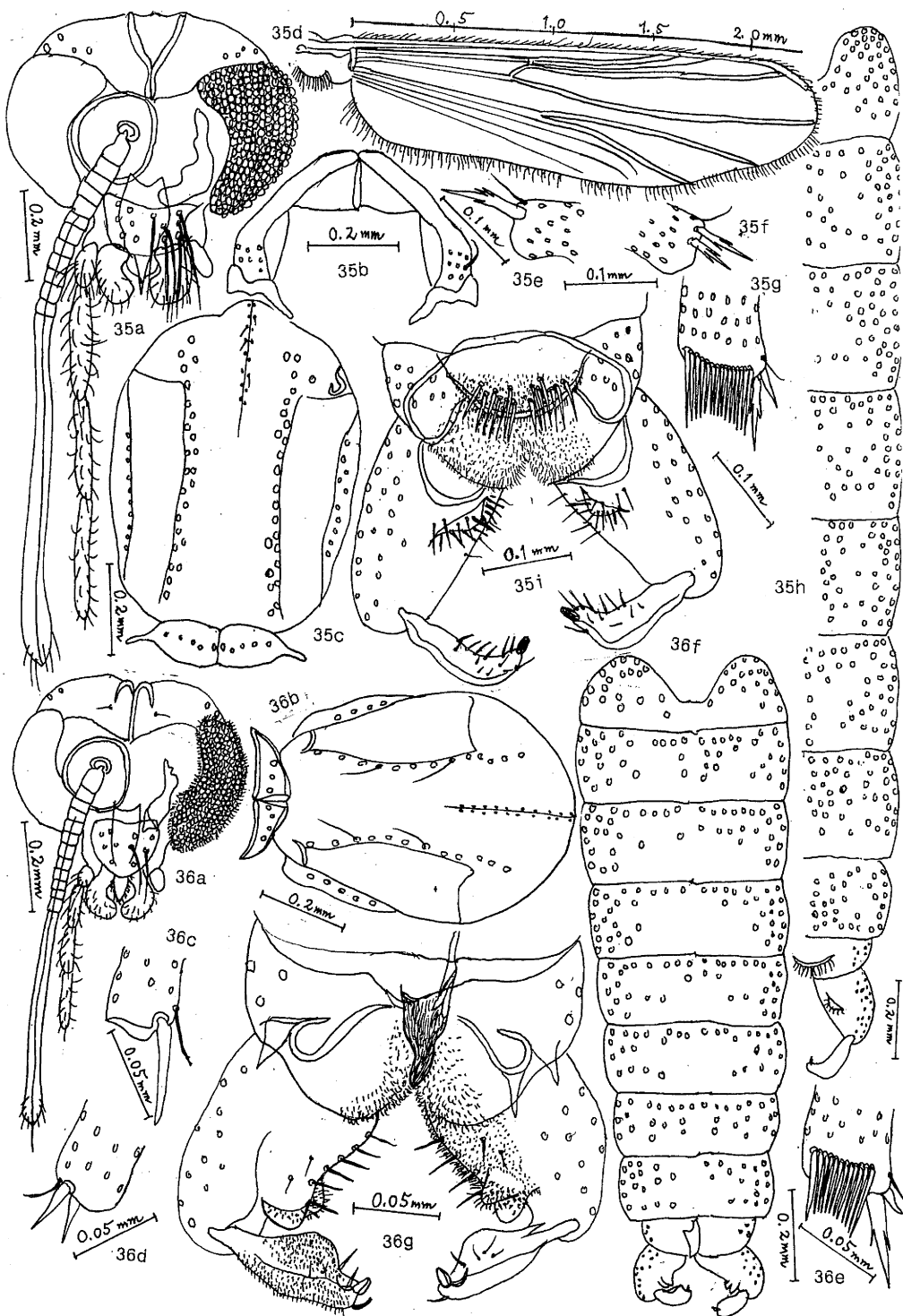


Fig. 35. *Tusimayusurika tusimudeea* sp. nov.  
 Fig. 36. *Smittia tusimoyezea* sp. nov.

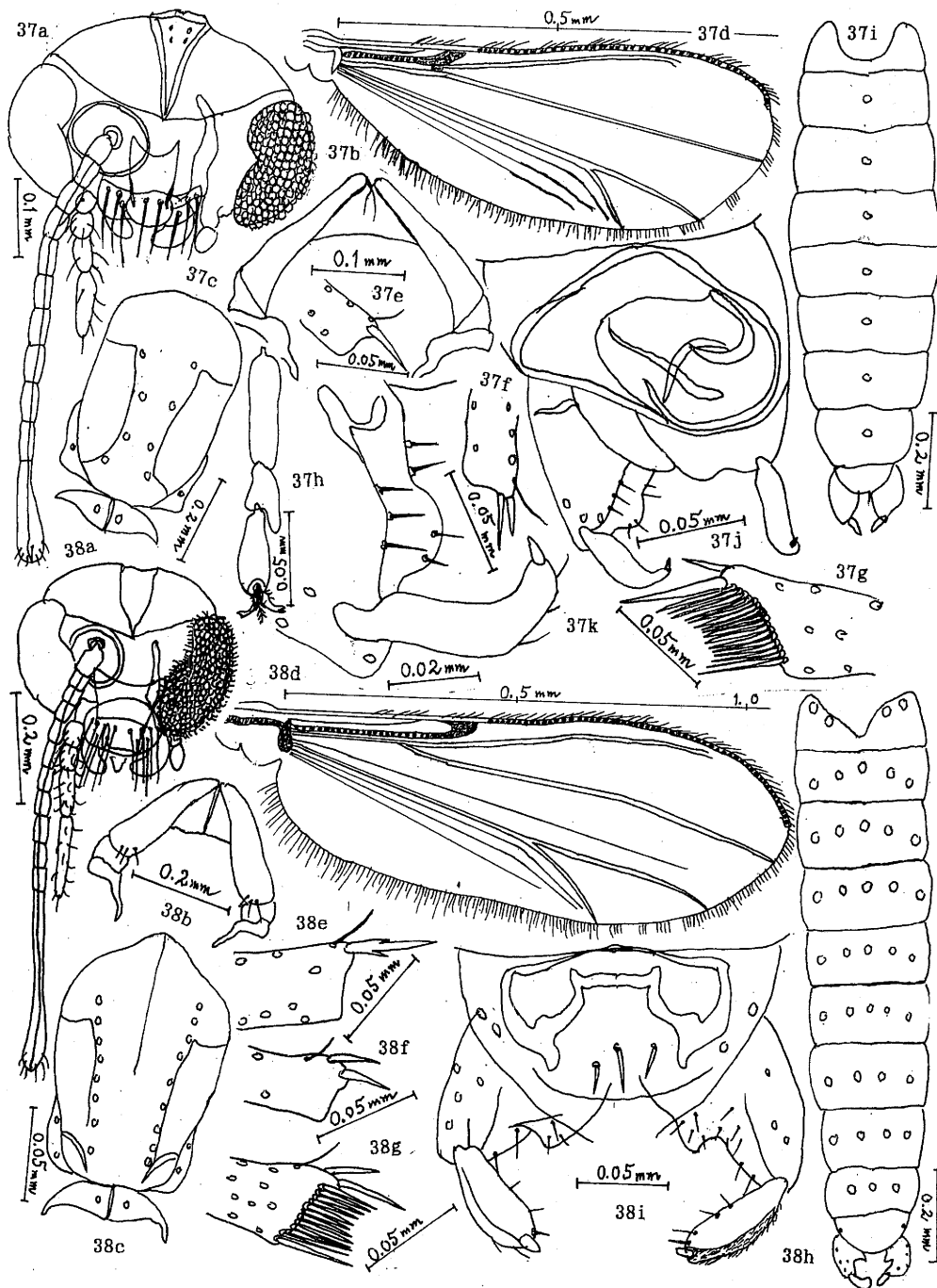


Fig. 37. *Corynoneura lobata* Edwards, 1924

Fig. 38. *Thienemanniella vittata* (Edwards, 1924)



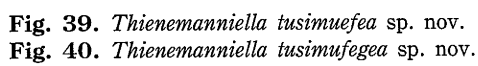


Fig. 40. *Thienemanniella tusimufegea* sp. nov.

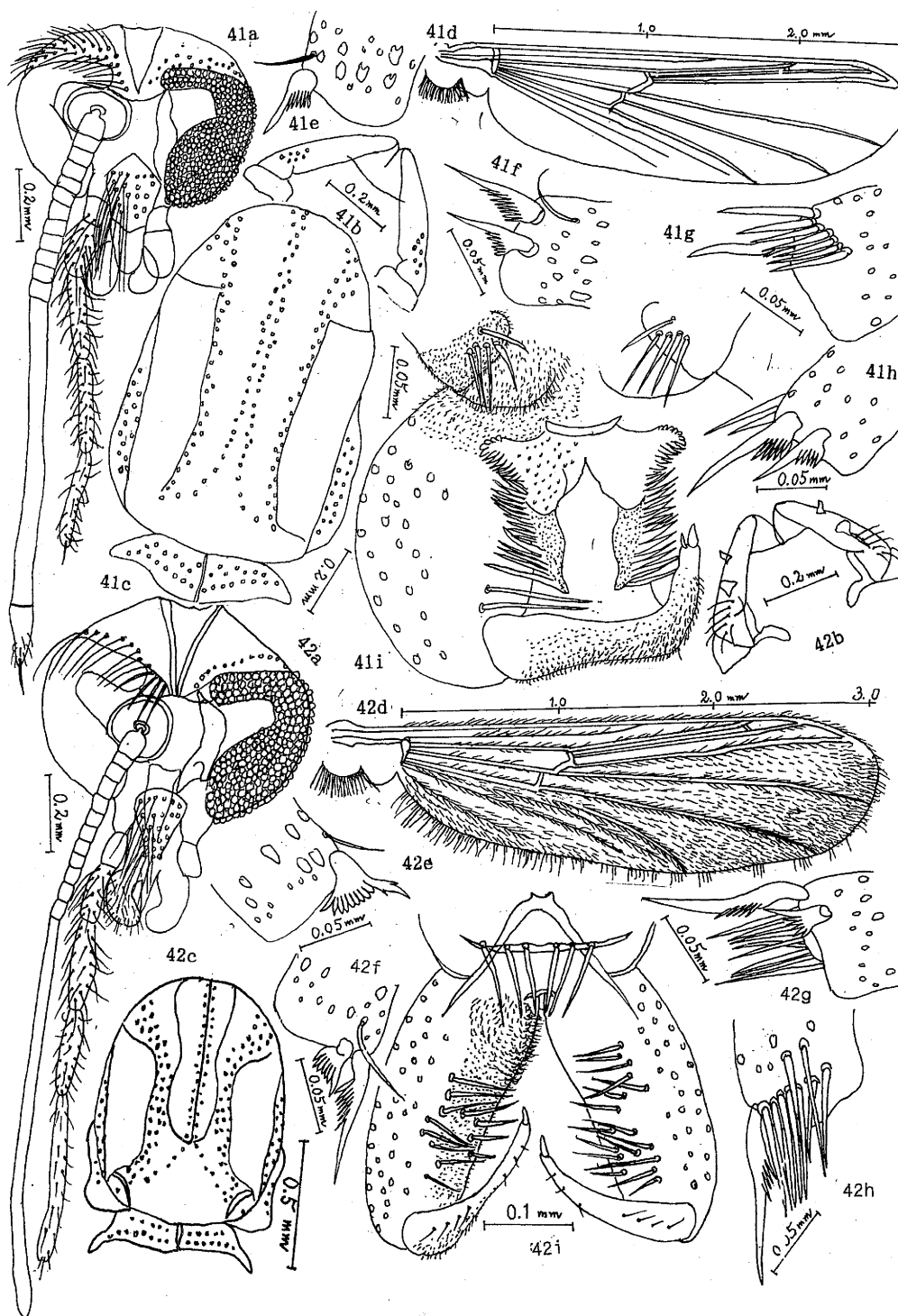


Fig. 41. *Conchapelopia tusimugehea* sp. nov.  
 Fig. 42. *Paramerina tusimuheia* sp. nov.

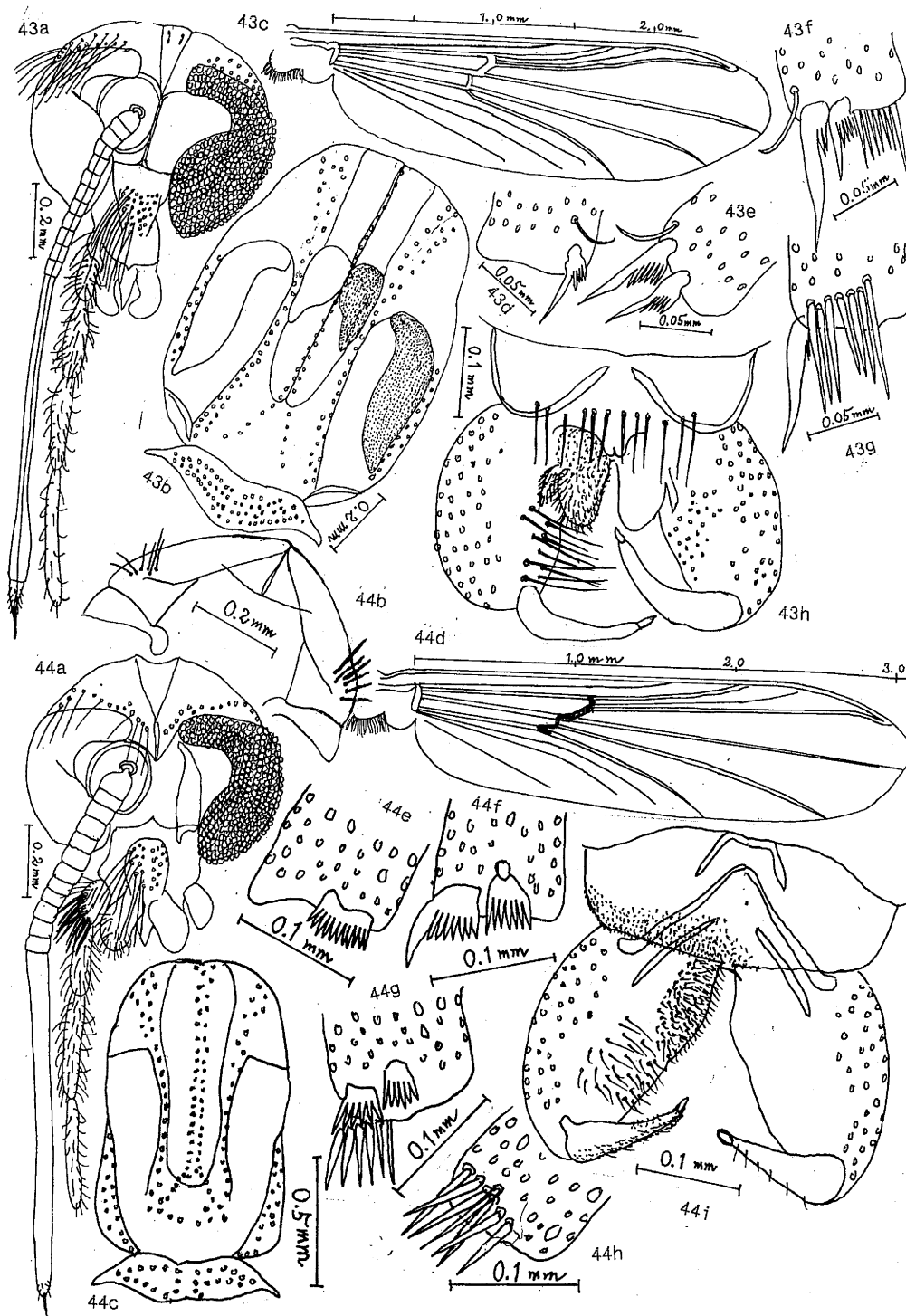


Fig. 43. *Rheopelopia ornata* (Meigen, 1838)

Fig. 44. *Trissopelopia oyabetrispinosa* Sasa, Kawai et Ueno, 1988